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An Address

ON

SOME VARIATIONS FROM THE NORMAL TYPES OF HUMAN METABOLISM.

Communicated to a Joint Meeting of the Liverpool Medical Institution and the Manchester Medical Society, Session 1923–24,

BY CHARLES J. MACALISTER, M.D. EDIN., F.R.C.P. LOND.,

LECTURER ON CLINICAL MEDICINE, UNIVERSITY OF LIVERPOOL; HON. PHYSICIAN, LIVERPOOL ROYAL SOUTHERN HOSPITAL.

AT the meeting of the British Association last year Sir Oliver Lodge, in an inspiring address on Man and the Universe, spoke of the doctrine of the ascent of man as being a hopeful one, because it explained so much. It explained our imperfections. He referred to man as a newcomer in a world whose antiquity is now estimated at 400 million years. "He is unfinished—still in the process of becoming and not complete." Although Sir Oliver Lodge was referring more particularly to defects other than physical there is no doubt that they, whether anatomical or chemical or both, are to be included among those which he said "could be understood and explained as stages in the process of development towards an ideal which lay ahead."

As medical men we are constantly confronted with problems upon which these fundamental truths have a direct bearing. In the process of evolution man has attained to what may be regarded as an average physiological perfection, but we frequently meet with variants from such a standard—some, as far as we know, purely structural, others definitely metabolic or chemical—which indicate that ancestral, or it may be reversionary, characteristics are present. These account for departures from health concerning which our help is often sought, and their study is interesting, not only from an evolutionary standpoint, but also because their origin occasionally throws light upon the most successful measures which may be taken for their correction or alleviation.

Man's present stage of development has probably been acquired through ancestral conditions of environment and opportunity, and these have led to his having structural and physiological complexities which present considerable variations. His habits as to food must have undergone extraordinary alterations, and his capacity for metabolising almost any types of food have surely resulted from great developmental changes in modern as compared with primitive types. The lower animals, so far as I am aware, have fewer of these complexities. They are in the main carnivorous or vegetarian, as the case may be, in their dietetic habits—and man's ancestry included both of these classes. A falling back to prototype may accord to him a lessened capacity for mixed metabolism, and it is this assumption that I go on to discuss.

DIETETIC METABOLIC VARIATIONS THE RESULT OF REVERSIONS.

I would suggest that dietetic variations of metabolism in man result from reversions, sometimes towards a carnivorous, sometimes towards a vegetarian type of ancestry, and if this be so, we must take it that there was a common stock from which these types originated. In the carnivora there was a latent or undeveloped vegetarian metabolism, whereas in the vegetarian primate type there was a latent carnivorous one. This hypothesis explains the possibility of there being an adaptability to new dietetic conditions on the part of primitive man as he emerged from the vegetarian or primate stage. With the development of the carnivorous instincts the latent carnivorous metabolism to which I have referred would become more and more highly developed, and by degrees the organs and secretions necessary for a mixed feeder would become evolved; changes would take place in the encrinoid secretions, and there would be retrogression of other parts whose utility had become lessened in the new circumstances. It is on this account that vestigial remains play such an important part in the problems of metabolism which mainly interest me. In this relation I would recall how the embryo and fœtus in the course of development illustrate many of the types belonging to postnatal conditions of former orders before the birth of the perfected infant man: (1) Protozoal type—unicellular germ-plasm; (2) notochord with gill slits; (3) budding limbs; (4) perfected limbs and well-developed tail of placental mammal with muscles for wagging it which afterwards become ligamentous and fixed; (5) up to sixth month the lanugo reminiscent of a period when hairy covering was essential as a permanent structure in ancestry; (6) in the fœtus 15 mm. long the milk streak containing the anlage of several pairs of breasts, which all disappear in the process of development except the normal permanent pair.

It needs very little stretch of imagination to consider how, by persistence postnatally of one or other of the characters of former ancestries, may be explained some of those permanent anatomical and physiological imperfections which account for idiosyncrasies of metabolism.

ANATOMICAL VARIATIONS IN RELATION TO PERSONAL IDIOSYNCRASIES.

In 1908, in a paper on the "Personal Factor in Diet,"[1] I directed attention to an example of this influence of a developmental arrest in the case of an individual presenting well-marked symmetrical polymastia, who had very limited capacity for metabolising the fleshes. In the years which have intervened many of these cases have come under notice, and an interesting observation in relation to polymastia which I made, when pathologist to the hospital, was the occasional association of a long spiral appendix, sometimes presenting a funicular opening, thus resembling what is normal in the anthropoid apes. Polymastia is sometimes regarded as an evidence of degeneration, and its subjects as possessing mental qualities of a decadent character. My own experiences do not confirm this. I prefer to regard it as resulting from an arrest of development which leaves the individuals with a physiology of a specialised type. Their intelligences and characters have usually been normal. But the important point is that, although they are generally mixed feeders and present in most cases full powers of digesting and utilising vegetable foods, they are truly reversionary so far as their animal protein metabolism is concerned, insomuch that, like the carnivora, their flesh-containing meals require to be taken at much longer intervals than is the case with average normal persons.

I have mentioned this type of case to indicate that there are people who present anatomical variations coincident with and throwing light on their idiosyncrasies. Quite recently a man has presented himself who suffered from severe attacks of indigestion for more than 20 years. There were sometimes considerable intervals of freedom from pain, but when the attacks began they tended to continue for long periods. There were anorexia, splitting headaches, pain and flatulence after food, and marked constipation. On examination a multiple polymastia was found. There was a pair of phantom areolæ in the seventh interspaces and another abdominal pair. It turned out that his dyspepsia was of ingravescent type—that is, it got worse as the day went on; often absent after breakfast, marked after his midday meal, and very severe after the evening one, the discomfort lasting well into the

[1] Liverpool Medico-Chirurgical Journal, 1908.

night and disturbing his rest. A further interesting note was the history of pains in his joints which he had ascribed to rheumatism, and he informed me that his father and mother, especially the former, had suffered from arthritic conditions. This type of dyspepsia is not uncommon, apart altogether from any visible evidences of arrested development, and I have little doubt that it depends on deficiencies of secretion and of elimination which bring it into the broad categories of gout. In other words, such dyspepsias result from idiosyncrasies or imperfections of metabolism which are probably reversionary.

The flesh-eating animal is a slow metaboliser. It lives generally on one meal a day, and in some instances such a meal is sufficient to sustain it for a longer period. The human being who has inherited a dominant carnivorous type of metabolism bears qualities which are reminiscent of what is normal in the pure carnivore. Convention and tradition have taught John Bull that three, often pretty substantial, meat-containing meals are likely to keep him fit. Perhaps most normal people can and do thrive on such a régime, but in those variants whose metabolism and powers of elimination cannot keep pace with the intake of fuel a breakdown occurs sooner or later, and the gouts appear. The inadequate organs are continually in a condition of overstrain owing to absence of metabolic rest-periods; health becomes impaired, and often enough life is shortened.

Perhaps I can best explain these rest-periods by means of diagrams which illustrate how waste products become stored up when idiosyncrasy is not met (Figs. 1 and 2). The remedy for these cases is not

FIG. 1.

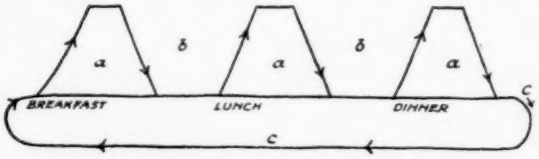

Diagram illustrating the rise and fall of waste products in the blood in the average type of metabolism—three flesh-containing meals a day being taken: (*a*) Metabolic period, (*b*) metabolic rest-period, (*c*) long metabolic rest-period during the night.

FIG. 2.

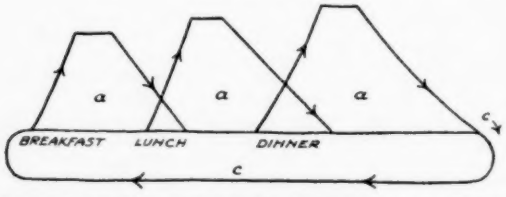

Diagram illustrating a slow metabolism, showing how the line of elimination crosses the line of rise of the waste products associated with successive meals. The diurnal metabolic rest-periods are lost and there is progressive accumulation of waste products in the blood. The nocturnal rest-period is shortened. (*a*) and (*c*) as Fig. 1.

far to seek; it simply involves an imitation during the day of what occurs during the night. There are many degrees of this type of inadequacy which could be investigated scientifically by chemical means, but for practical purposes the history of the patient's trouble generally enables one to determine whether more than one flesh-containing meal is advisable. In most cases it suffices to allow a moderate amount of animal protein with breakfast and a fairly substantial dinner in the evening—very little, if any, food, and certainly no flesh, being permitted in the middle of the day.

Civilisation has doubtless had much to do with the weakening of those instincts in man which inform the lower animals what is unsuitable in the way of food. The senses of smell, taste, sight, and touch are keen advisers among animals. Human beings, on the other hand, suffer a good deal owing to the depreciation of these guides. Every now and then, however, we come across children in whom the instinct guides remain; children who dislike certain types of food, sometimes animal, sometimes vegetable. We have all come across children who dislike the traditional milk puddings, and become sick when forced to take them, or who do not like meat or fat. They are sometimes brought to us because they are supposed to be ill, the fact being that their natural instincts indicate that they have physiological inadequacies for the metabolism of the types of foods against which their tastes rebel. They are variants from the normal average, reversionaries perhaps towards the carnivorous or vegetarian types, as the case may be. The starch dyspepsias in some cases have this explanation, and how often are they treated by giving those remedies which are likely to aid the digestion of the food element which they require in lesser rather than increased amounts.

I am not dealing now with rare anomalies of metabolism but with those we encounter in our daily work.

INTERSEXUALITY IN ANIMALS.

Of all metabolic problems there are none quite so puzzling as those which seem to depend on sexual aberrations; cases in which males present some degrees of femininity or where females have or come to possess male characteristics. These cases are not uncommon, and they develop at varying periods of life. In the human being they do not attain to the extreme degrees referred to by Goldschmidt in his writings and recent addresses in this country, or by Dr. Crewe's hen which became a cock and, after doing its duty as a layer of eggs and a mother, eventually became the father of a family.

Preponderance of sex does not mean that there may not be present some degrees of intersexuality so far as hormone influences are concerned. It seems perfectly clear that the determination of sex takes place at the time of fertilisation of the ovum—that is, that if the X chromosome of the sperm unites with an X of the germ the offspring is female, whereas a union of chromosome Y male with the X female results in a male; but this does not imply that there may not be subsequent intersexuality due to the inheritance possessed by every individual, whether male or female, of hormones belonging to both sexes. There are dominant hormones belonging to and ruling the sex of the individual, and subdominant (or latent) ones of the opposite sex. The fact that mixed sex phenomena occur has, of course, been recognised for long—we are not unfamiliar with them in our clinical work—but the scientific study of intersexuality and its relation to sex determination has been largely carried out by a school of which Goldschmidt is representative. For my own knowledge of it I am largely indebted to his work as translated by Prof. Dakin,[2] whom I freely quote. It has been shown that in the animal kingdom there are two groups which are distinguishable from one another so far as determination of the sex characters of the individual are concerned.

1. Among the insects (moths, caterpillars, &c.) sex and everything appertaining to it is fixed at the time of fertilisation. Every cell of the body is then determined sexually, and there is no possibility of one part of the body being influenced by another. This has been proved experimentally, both by destruction of the sex organs and also by their transplantation, male to female and vice versa, both in the embryonic state of the insect and later. In neither case has any influence or change been produced in the secondary sex characteristics of the adult. Evidently the sex organs and the bodily structures which characterise the sex are quite independent of one another.

2. In the mammals, birds, &c., on the other hand, the distinctive characters are influenced by the presence of the

[2] Mechanism and Physiology of Sex Determination, by R. Goldschmidt, translated by W. J. Dakin. 1923.

secretion of a ductless gland—i.e., there is a central organ which produces the hormones (and controls others) which are necessary for the completion and maintenance of the sex determination. There are no longer the independent activities of the individual cells throughout the body, but a coördinated and regulated development of sex characteristics, whether male or female, which is brought about by the activity of a secretory centre, situated in the reproductive organs. Castration experiments, such as those made in insects, are therefore very different in their results. In place of no change taking place in the secondary sex characteristics of the individual, the removal of the essential internal secretions brings about a modification or a disappearance of the characters of the sex, whereas, on the other hand, transplantation of the organs of the opposite sex results in the production of the secondary sexual characteristics of that sex.

Intersexuality in the first (insect type) group is therefore zygotic and entirely determined at fertilisation. Intersexuality in group 2 (mammal type) is hormonic and dependent for its development on the influence of internal secretions acting after fertilisation.

HORMONIC INTERSEXUALITY IN MAN.

That hormonic intersexuality exists in man there can be no doubt. We know it from the effects of castration after the period of childhood (I shall refer presently to conditions coexistent with the arrest of development of the sexual hormone produced in the child), for it must be understood that intersexuality the result of castration only influences those organs or parts which develop, or are capable of developing, after the operation. The general result is that they approach the female type. The distribution of the pubic hair and the non-development of the beard point in this direction, and also the mammary gland and broad nipples and areolæ may develop. In other words, some degree of intersexuality has existed, and the already present but subdominant female hormones exert their influences upon these parts which have possibilities of differentiation when what would have been the dominant male-producing hormones are removed. We have clinical evidences of the same kind in women also. This relationship of the sex hormones can be best explained by means of a diagram (Fig. 3) on the lines of one in Prof.

FIG. 3.

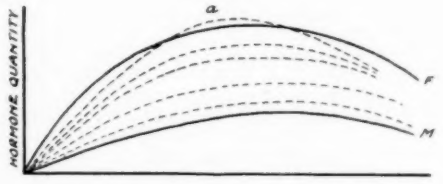

Diagram illustrating the relationship of the male to the female hormonic curve in the case of a female. The dotted lines indicate how the male curve may approximate the female one, or temporarily cross it at (*a*).

Dakin's book. The curves represent the hormone factors and I would direct attention to Goldschmidt's statement in relation to them, that a high concentration of one of the two hormones is not alone decisive for the production of pure sexes; a minimum of difference between the two is necessary. The dotted lines are curves of male hormones in different grades of female intersexuality showing how the male hormones may approximate the female ones and finally cross them. At (*a*) the diagram shows how the male line may cross the female one temporarily. This is a very complex subject and has interested me because many years of clinical observation have suggested that not a few disorders depend upon incoördinations of function which are brought about by mixed or approximating sexual metabolism. Some of these begin early in life and some later on; I rather think that in the main they become manifest at one or other of the climacteric periods. I have met with a case of a boy, aged 14, who presented a well-marked secondary anatomical characteristic. He had a unilateral female breast. So far no pathological phenomena have presented themselves, and he is quite boyish in his propensities.

ATELEIOSIS.

The degrees of intersexuality are very variable. There are evidently cases which may be regarded as neutral, or in which the sex dominance is delayed at all events until a late period of life. We have an example of this in that very interesting variety of dwarfism designated ateleiosis (not arriving at perfection) and defined by Dr. Hastings Gilford.[3] It is characterised by conspicuous delay of growth and retardation of development; not necessarily an absolute arrest, because both may simply be very retarded. The subjects of it are not hermaphrodites externally. The sex is determined, but the hormone influences are arrested. For instance, the person may grow very slowly even up to the age of 30 or later, long after the normal period of growth has been passed. The point about these cases is that they are normally proportioned little people who have simply stopped growing at a normal rate during the period of childhood. They are the Peter Pans of real life. They retain the characters of childhood during the years when they should be adolescents or adults, or even until quite old. Sometimes the retardation begins during fœtal life, as in the well-known case of the Sicilian dwarf, who was only 7 inches long when born at the full time, and was 19½ inches tall when she died at 9 years of age. Her sexual organs (ovaries, uterus) and her bladder resembled those of a four months fœtus—i.e., the time when the arrest of her development probably began. Her ossification and dentition were those of a 2 years old child, but her proportions were perfect, and she was not deformed. General Mite, who died at the age of 41, was 31⅜ inches high, and weighed 14½ lb., was another of these antenatal cases. His sex organs remained quite infantile.

Cases of Ateleiosis Beginning Postnatally.

Commoner are those varieties of ateleiosis which begin postnatally. They generally grow normally until the second year or later childhood. I recently showed some of these cases in Liverpool, among them—

A boy, who developed normally until his fourth year, when he ceased to grow at the normal rate, and is now in his twelfth year developmentally a child of 5. His height is 3 feet 6 inches, weight 3 st. 8 oz. Radiographs of his bones show that the centres of ossification are those of a child of 5 years old. He is bright and intelligent and in the seventh standard at school.

The following case I have had under observation for the longest period.

A male, aged 40, grew normally until 7 years of age, then very slowly until 10, and after that hardly at all for a number of years. At 14 he stood 3 feet 10 inches, and weighed 3 st. 10 lb. He had then the appearance and development of a properly proportioned boy of 8. He was a bright, clever, and intelligent little boy, and a lady presented him with a toy cart and horse which amused him a good deal. He remained in this childish condition with little augmentation of height, but with childish sex organs and no pubic hair, until 22 years old, when he began to grow (after being dosed with thyroid substance), and he went on growing for three or four years until he measured 4 feet 10 inches at about 30 years of age. During the past 10 years he has gained nearly 2 inches and is now just under 5 feet high. He still has the face and rounded limbs of a young boy, but, strange to say, his sex organs began to develop two or three years ago. He has grown some pubic hair and the rudiments of a beard and moustache which he shaves about once a fortnight, and he has also manifested some virility. He has the female pubic distribution and rather prominent breasts. Evidently the curves of the sex hormones have slowly risen, the male are dominant, the female not far distant; a strange example of growth and development going on into middle life.

[3] Disorders of Postnatal Growth and Development.

These interesting cases illustrate a neutral type of sex metabolism. Ateleiotics are almost always cheerful and intelligent, and possessed sometimes of a great sense of humour. Their retained childishness is sometimes associated with a liking for the games of the young. It is interesting that they are said never to become bald even if they live to be quite old (there is a case recorded who lived to the age of 98), and certainly my cases just related have fine heads of hair. Cases of well-grown males presenting intersexuality have this same characteristic. Subjects of ateleiosis are much sought after for purposes of shows. In a juvenile troupe which I inspected some time ago the comedian of the party was upwards of 20, although he had the appearance of a little boy. Neutrality of this kind is not so distressing in its result as are those intersexualities which bring about their effects at a later period of life. There are some cases often classed as adolescent neurasthenics or as being hysterical which belong to this category.

I have recently seen a youth, aged 16, tall and effeminate-looking, with cold, blue extremities and rather poor physical development, who has quite definite indications of femininity in his prominent mammary areolæ and follicles, his undeveloped sexual organs, and female distribution of the pubic hair. His thyroid, too, is large and from time to time fluctuates in size. His thymus shadow (X ray) is also large. Here surely the subdominant female hormone curve approximates the dominant male one.

There are certain epileptics of both sexes who possibly come into this same class. Some time ago I saw a man, aged 30, who began taking fits at the period of puberty. They were suggestively periodic, occurring at monthly intervals, and he, too, had these prominent and broad mammary areolæ, little growth of facial hair, and the female pubic distribution was well marked.

The sexual hormones have so well-known an influence on the nervous system that it is not wonderful that psychoses and neuroses should be associated with a clash brought about by their incoördination. Two cases have left an indelible impression on my mind with reference to this.

The first was an adolescent girl who since puberty had developed a degree of melancholia with delusions of fear. She had the usual blue, cold extremities, slow breathing, and general apathy so common in these cases. Menstruation was not in abeyance, but she was always worse at these times, and had on one occasion threatened suicide. This girl had a large growth of downy hair on the sides of her face and on her lips and chin, and a marked triangular male distribution of the pubic hair. Here, again, the curve of the subdominant male in the individual was running high, and had perhaps overtaken the dominant female one, and there can be little doubt that the psychic disturbance was a corollary to this fact.

The other case was a young man of about 23 presenting female attributes. He had a rather soprano voice, no facial hair, the female pubic distribution, and prominent nipples. He had one small testis, the other being undescended, and he presented the nervous temperament and the cold, blue extremities which seem to be associated with incoördination of the sexual hormones.

GASTRIC ULCER AND INTERSEXUALITY.

I have often wondered whether gastric ulcer is in any way related to an intersexuality perhaps with temporary crossings of the female curve by the male one. It is one of those diseases which we rather tend to look upon as an entity, but I think there are reasons for believing that the ulcer is a local manifestation of a constitutional condition. Duodenal ulcer is essentially a male disease; the perforating gastric ulcer attacks the female. Is there any explanation for this? Possibly some light may be thrown upon it by a careful analysis of its symptoms, not those appertaining to the ulcer itself but the ones which lead up to it. It will almost always be found that a considerable change takes place in the constitution of the patient. Sometimes this change occurs at or about the climacteric period of adolescence, but at all times it is reminiscent of some of its accompaniments. If a girl is observed who is passing through this period it can often be noted that the ruddy cheeks and robust habit of body, the warmth and activity of the child, give place to a tendency to blueness and lividity. The thyroid becomes enlarged, sometimes greatly so, in its effort to supply secretion. The face and extremities look cyanosed and the latter are cold. Apathy and syncopal attacks are not uncommon accompaniments. This is related to an, as yet, unestablished balance in the sexual hormones. Vascular spasm is characteristic. Now inquire into the history of a case of gastric ulcer and observe the resemblance. These patients almost invariably start their trouble with somewhat similar phenomena: coldness and blueness of the extremities, heliotropic complexion, coldness and not infrequently cramps in the hands and feet. If menstruation has previously been established there is frequently amenorrhœa. Then comes the indigestion; not pain after food, but a feeling of weight and fulness indicative of deficient enzyme secretion, and at last the ulcer, a little punched-out affair without surrounding thickening or inflammation. The pain characteristic of the chronic phase of gastric ulcer is a later symptom corresponding to the period of subsequent inflammation. The prodromal symptoms are those of vascular spasm like those of the climacteric. If in the female the subdominant male curve approximates the dominant female one, or temporarily crosses and recrosses it, it is quite conceivable that the results I have described might follow and an explanation be found for a perplexing trouble. The hypothesis is worth thought, especially since the administration of thyroid gland often remedies the prodromal conditions, including the amenorrhœa if it be present. I always give thyroid in gastric ulcer both during treatment and for some time after recovery.[4]

I have only one thing more to add about inherited sex metabolism in relation to disease. Over a period of 18 to 20 years in my large children's out-patient clinic I have been noting the colour of the children's eyes and some other attributes in relation to those of their parents, and it seems pretty clear that in a given generation reciprocal criss-cross inheritance is commoner than linked sex inheritance. That is to say, a girl tends to inherit her father's attributes, a boy his mother's. If a father is blue-eyed and the mother brown-eyed the sons are often brown-eyed and the daughters blue-eyed. A tall father and a small mother tend to produce small sons and tall daughters. It is this principle which has given rise to a truism that if a man wants to have clever sons he must take care to marry a clever woman. There are plenty of exceptions, but this form of inheritance is common enough to make it noticeable. Departure from this order of things is occasionally associated with some degree of intersexuality; for instance, I recently saw a well-developed girl, aged 15, suffering from asthma which began in childhood and became worse at puberty. She was a dark-haired girl with blue eyes; she tended to be hirsute about the lips and presented some other intersexual characters—e.g., triangular pubic hair. She was the blue-eyed child of a dark-complexioned and dark-eyed father and had inherited her mother's blue eyes and other characters (including asthma by the way) as though she had been intended for a boy—a confusion of hormonic coördination. This, however, is debatable ground, and there are Mendelian factors at work in this realm of inheritance.

Hypothesis based upon observation has led me to a consideration of these metabolic variations and imperfections and of their association with flaws in the balance of our bodily chemistry which may account for some of the disorders which we encounter in our everyday experiences.

[4] Since the above was written, a man, aged 21, has been under observation in the Royal Southern Hospital presenting the clinical signs of gastric ulcer and with a history of the prodromal symptoms referred to. He was of fair complexion, had a girlish face, no signs of facial hair. The mammary areolæ broad with prominent nipples. Female distribution of the pubic hair. Testicles small. The bodily contour not masculine. This case, presenting signs of gastric ulcer, confirms the hypothesis that this disease may be related to intersexuality.

THE CELLULAR CONTENT OF MILK: VARIATIONS MET WITH UNDER PHYSIOLOGICAL AND PATHOLOGICAL CONDITIONS.*

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(*With Coloured Plate.*)

Introduction.

OF late years increasing attention has been given to the consideration of milk-supplies from the public health point of view, and the old standards, depending largely upon the senses of taste and smell, and the relative proportions of solids and cream, on specific gravity and opacity, are no longer regarded as the ultimate basis for a proper judgment as to the quality of milk. Various new methods have been introduced, especially in America, for the purpose of controlling the character of these supplies. These have for the most part been directed to the determination of two different sets of conditions: (1) The number of micro-organisms present in milk; (2) abnormal constituents in milk arising from the condition of the udder. Obviously both problems are intimately related and cover wide fields; in this paper the latter only is investigated.

American observers, attacking the problem of the cellular content of milk from the purely quantitative point of view, have formulated standards for milk inspection by which practically whole herds have been condemned; on their standards as many as 90 per cent. of a herd were condemned for producing milk which was supposed to contain pus. Such an example illustrates the chaotic state of our knowledge of the nature and source of these cellular elements of milk. At present there is no general agreement as to: (1) The nature of the cellular elements of milk; (2) the origin of such elements; (3) the significance of the presence of various types of cells; (4) the part some of these cells play in the physiological process of milk production; (5) or their significance in the various pathological processes which may occur in the cow's udder. To elucidate these problems the present work has been undertaken.

Among the difficult problems of modern dairying, still remaining unsettled, is that of the significance of the cellular elements and micro-organisms that occur in milk. On these there exists the greatest divergence of opinion, even on what appear to be the simplest questions.

W. G. Savage,[1] writing on this subject, remarks very pertinently, "That milk should not contain pus." Few will deny this, but what constitutes pus in milk? All milk contains leucocytes, but do these leucocytes become converted into pus cells, and if they do how can one be distinguished from the other? The presence of a certain number of leucocytes in milk is strictly physiological, though, beyond a certain point it may, probably does, become a pathological feature. What, then, are the bounds to be set to our characterisation of these conditions? One school holds firmly to the idea that the cellular contents of milk are all derived from the blood; that they are true blood cells, and that under certain conditions they constitute pus. Another school as firmly denies the above proposition, and asserts that the cells of milk are tissue cells of purely epithelial origin which under no circumstances can be spoken of as pus cells. As in most similar problems, the truth, as I hope to be able to demonstrate, appears to lie somewhere between.

Methods of Procedure and Examination Used in this Investigation.

These must include a method of staining which would enable the observer to distinguish the various cells that may be present. Any method which fails to include this fails, in my opinion, in its entirety. The extraordinarily divergent results described, the contradictory statements made, and the confusion which exists in the literature of the subject, are due the failure of most observers to recognise and to appreciate this elementary condition.

The cells found in milk are many and of various types. Their presence in normal milk undoubtedly must indicate, and be a measure of, the various changes which occur in the secretory tissue and ducts of the milk gland during the physiological secretory process. Given a certain physiological condition of the udder an appropriate cell indicating that condition will make its appearance in the milk. Given a pathological condition of the milk-ducts or acini, and again amongst the solid contents of the milk certain cells must predominate. The use of any method, therefore, which fails to differentiate these various cells must lack the one thing essential for our purpose. Miller[2] says: "As regards leucocyte and pus cells there is no intrinsic difference. A leucocyte in fluids other than blood plasma, as milk, for example, soon undergoes changes which render it indistinguishable from a pus cell." The oft-quoted statement of Savage,[3] that he cannot differentiate between a leucocyte and a pus cell is, undoubtedly, true so far as the comparatively few isolated cells of a clean milk are concerned, but not when applied to a large percentage of cases.

The appearance of a high cell count due to some physiological process—if we are unable to distinguish this cell from one which predominates in a pathological condition—may lead us to pronounce the udder diseased in cases in which no disease exists. The want of a method such as that above described, where alterations in the cell count have taken place, has often given rise to statements of which the following is a typical example:—

> "It was not surprising, therefore, when making consecutive observations on a carefully watched herd, to find that a cow which throughout her whole period of lactation had given a milk low in leucocytes, should suddenly develop pus, and that such a development indicated the close of her milking period. In almost 75 per cent. of the herd, perfectly healthy, clean cows show pus at the close of the milking period; and a coincident chemical analysis indicates that the percentage of butter-fat is from 0·5 to 1·5 per cent. above the normal for that particular individual. Such a condition is interpreted as indicating the termination of lactation, and accordingly the cow is at once dried off with, apparently, advantage to both herself and her calf."[4]

I hope to be able to show that although the cell count is increased in milk taken from a cow which is drying off, the condition is entirely physiological and certainly not pathological. Had the cells been properly stained with a differential stain, such a mistake could scarcely have been made. The important feature in the method I have used is that it consists essentially in a differential cell count, the cells being distinguished, counted, and classified according to their morphological characters.

An accurate knowledge of the characters of the various cells found in milk is essential for a differential count. My observations lead me to give the following cells as those to be found in milk obtained from a normal animal.

1. *The Finely Granular Eosinophile Cell.*—A polymorphonuclear cell, more or less round or elliptical or even irregular in outline, the shape depending on various factors, such as the length of time which is allowed to elapse between milking and the examination and the speed at which the milk is centrifuged.

The cytoplasm is clear, and remains unstained by Jenner's method, the whole being filled with very fine granules which stain a brilliant pink.

The nucleus, as a rule, stains a deep blue; unless the cell is old, or degenerated, when it stains badly. It may be branched or lobulated, the lobes being held together by fine chromatin threads. In nearly all the cells of this type the nucleus is seen to be formed of a thick chromatin network, some parts of which take the stain much more readily than others.

The size of the cell: The size varies between 10–12 μ in diameter. In the cells of fresh milk, examined immediately, pseudopodia stretch out from these cells in all directions,

* This investigation has been carried out on behalf of the Medical Research Council.

while even in many samples of commercial milk the cells are seen to be distinctly phagocytic—the bacteria being contained in vacuoles lying in the substance of the cell. (See Fig. I.) In other samples of commercial milk these cells often break down, and stain badly, the nucleus protruding through the cell cytoplasm. Crowds of bacilli may often be seen surrounding them.

This polymorphonuclear cell is constantly found in milk. In a normal sample the number is very small, almost negligible; but in milk from an inflamed quarter, the number may be very considerable. Fig. II. (cow 9, L.H.Q.) shows a film prepared from the deposit of milk taken from an acutely congested udder, the result of sending the cow to market with an abnormally full udder. In view of this custom of farmers and dairy owners too great stress can scarcely be laid on this point.

2. *The Coarsely Granular Eosinophile Cell.*—The coarsely granular eosinophile cell is slightly larger than the finely granular polymorphonuclear cell, it is oval or round in shape, and measures 10 to 13 μ in diameter. The cytoplasm is perfectly clear and transparent, but in this case again is closely studded with highly refractile granules, measuring in some cases as much as 0·5 μ in diameter; by Jenner's method these granules stain a deep pink.

The nucleus, usually of a light blue tint, is placed either in the centre of the cell or, more commonly, towards the periphery. It is either kidney-shaped or lobed, the different lobes being connected by bands of nuclear substance. In many films the cells appear to have burst; the granules are then scattered in all directions.

3. *The Large Mononuclear Leucocyte.*—The large mononuclear leucocyte is one of the largest cells met with in the deposit from cow's milk. It is round or oval in shape, invariably staining a dark blue. The stain, however, is not evenly distributed, but appears as a tangled thread throughout the substance of the cell. This is the nucleus which fills up nearly the whole of the cell. Usually, however, there is a small portion of cytoplasm on one side of the nucleus, but it rarely makes a complete circle round it. This portion of the cell is stained less darkly, but it is nevertheless of a distinct blue colour. These cells are invariably present in all samples of cow's and goat's milk, and in some are a very prominent feature. (Fig. III.)

4. *The Lymphocyte.*—The lymphocyte is a small blue cell which, as a rule, stains deeply. The cytoplasm is small in amount and forms a thin ring of light blue colour around the darkly-stained nucleus. These cells vary in size from 2 to 4 μ, the majority measuring about 3 μ. The nucleus is round or slightly oval in shape, stains darkly, and is not reticular. It occupies almost the whole of the cell. Such cells are fairly numerous in normal milk, but appear to be found in greater numbers in certain breeds of cattle than in others. (Fig. IV.)

5. *The Basophile Cell.*—The basophile cell (8–10 μ), a rare cell, is almost circular in shape, but may be oval. The cytoplasm is clear and transparent, and has scattered unevenly throughout its substance dark blue granules, large and small. The large nucleus occupies two-thirds of the cell, it is oval or rounded, and is always single. By Jenner's method it stains a pale blue. As a rule, the basophile cell is absent from films of normal milk, but under certain conditions it appears, though never in great numbers.

6. *The Large Neutrophile Cell* (5–9 μ).—The large neutrophile cell is extremely rarely met with. It is oval in shape, rarely round. The cytoplasm is stained a faint light blue throughout, the whole being filled, except in the region of the nucleus, with very fine granules, which take on a pale mauve tinge. By Jenner's stain the nucleus is tinged light blue.

7. *Red Blood Corpuscles.*—Red blood corpuscles are invariably present in a sample of cow's milk. In normal milk they are exceedingly few in number; as a rule, only one or two are found in a film made from the deposit of 10 c.cm. of milk. It must be remembered, however, that in milk films the individual red blood corpuscles are not exactly similar to those found in normal blood, but they are always easily recognisable.

8. *Large Epithelial Cells.*—Large epithelial cells are almost always present. They vary greatly in size, some measuring as much as 20 μ in diameter. The cytoplasm is somewhat granular, having a ground-glass appearance; it stains a more or less deep blue with Jenner's stain. The cells are usually rounded, but may be oval, and appear to have a well-developed envelope, which takes on a slightly deeper stain. The nucleus is large, oval or rounded, occupying a quarter of the cell, and stains a less deep blue than the rest of the cell. It usually has a mottled appearance as though composed of a chromatin network. In the cytoplasm of the cell are usually one, two, or even more clear spaces with well-defined outlines, usually round, more rarely oval in shape. These are fat globules surrounded by an envelope which prevents the fat from taking the ordinary fat stains.

9. *Mononuclear Eosinophile Cell.*—Other vacuolated cells appear from time to time in milk. Apart from the finely granulated eosinophile cell which may become vacuolated through age, or otherwise, there are other cells which closely resemble them. The cytoplasm of these cells, instead of being clear and transparent, stains a light pink, the substance being more or less vacuolated. The nucleus stains a light blue and is usually pushed to the side of the cell by the large number of vacuoles in the cytoplasm. These cells are abundant, especially when the cow dries off; but they may be present at other times. They may, however, be unvacuolated, when they may measure 9–10 μ in diameter, but they are often less than this. I regard this as an epithelial cell, probably derived from the secretory layer of the gland tissue. (Fig. V.)

The vital objection which can be urged against many methods of investigation is that all the cells are considered and counted as leucocytes. Obviously, in some cases of mastitis, in which the majority of the cells are of the polymorphonuclear type, the resulting count will be correct; but in more chronic cases, or in other conditions when these cells do not predominate, the methods break down, and can have little practical use.

Method of Cell Examination Adopted.

The method of cell examination adopted in this inquiry is essentially a differential count method, and a stain is used which has been found to give constant and reliable results. The procedure is as follows:—

The animal is milked in the ordinary way and at the usual times. During the milking three samples of the milk from each quarter—12 samples in all—are milked direct into sterilised test-tubes, which are plugged immediately. Of the three samples one is taken at the commencement of milking—called the "fore-milk"—another in the middle of the operation—the "middle-milk"—and a third at the end of milking (but without any undue straining)—the "strippings." Taking each of these samples in turn the tube is well shaken and 10 c.cm. poured into a centrifuge tube of Houston's pattern, the lower part of which is drawn out and accurately marked with a scale of 1/100 cm., and centrifuged at 3000 revolutions per minute for ten minutes. The cream and supernatant fluid are carefully removed, 0·5 c.cm. of milk being allowed to remain above the deposit. These are thoroughly mixed with a capillary pipette on which is a bulb and into which the mixture is finally drawn up. The pipette is then sealed off and centrifuged until the deposit is carried to the bottom of the pipette, whence with a still finer tube it may be removed and spread on a glass slide. The film is then air-dried, stained at once by Jenner's method, examined with a Zeiss 1/12, and the cells noted, described, drawn, and counted.

This method is not put forward as giving correct numerical results, but rather as a differential method in which the well-stained cells of different types may be readily distinguished.

The question now arises, are all the cells thrown down as sediment in the centrifuge, or are some carried upwards and held in position by the cream which rises to the surface? In normal milk I have found that the number of cells entangled in the cream is a negligible quantity, and it is necessary in any differential count to examine only the deposit found at the bottom of the pipette.

Cellular Content of Normal Milk.—Taking a sample of milk from any quarter of the udder of a cow selected at random one is struck at once by the variety of cells met with. Should the cow happen to be a normal animal—e.g., a heifer some days after her first calf, without any complications or udder trouble after calving—the blue cells, both large and small, which occupy the field are numerous, and at once arrest attention; indeed, one is apt to make up one's mind that the milk is full of lymphocytes both of the large and small variety. Looking over the fields one may observe here and there, not usually more than one per field, a finely granular eosinophile cell, with nucleus sharply stained, and with the granules distinctly visible; characters that enable one to pick it out without difficulty from the surrounding cells. It would be a great mistake, and very misleading, to class these cells together as pus cells; most of them are broken-down polymorphonuclear cells. Now and again a coarsely granular eosinophile cell which stains well, resembling very closely the coarsely granular

eosinophile cell of ox's blood, may be seen. Again, a much larger cell, round or oval in shape, with large pale blue nucleus, the cytoplasm of the cell staining a mottled blue, may be present. Evidently these different cells cannot be lumped together as pus. Moreover, one finds in the field a number of small dots, stained deep blue, 1μ or so in diameter, sometimes with only a tag of pink substance around the blue point, or near its edge. These are obviously nuclei extruded, possibly, from blood cells, but more probably from secretory epithelial cells of the acini. The pink portion is part of the cytoplasm of the cell which was torn away when the nucleus was extruded. From this picture, which is invariably presented in the sediment from normal milk, it is obvious that a simple count can give no information as to the condition of the secreted fluid or of the secretory tissue. The number of cells (lymphocytes), added to the stray polymorphs, coarsely granular eosinophiles and tissue cells, along with the extruded nuclei, may give a high "leucocyte" count: but under these circumstances we cannot justly claim that the cow is suffering from a diseased condition of the udder or that the fluid is "pus." A differential count of cellular deposit must always be made before a diagnosis is justified.

Cellular Content of Abnormal Milk.—A high cell count is not of necessity evidence of a diseased udder, nor, on the other hand, does a low count necessarily indicate an udder free from disease. The actual count may, of course, in certain doubtful cases help in the formation of a diagnosis, but it cannot by itself be depended upon. For the present I insist simply on the point which I consider to be of vital importance in all cytological examinations of milk, the necessity of applying this differential staining and counting method *quarter by quarter;* for it is not sufficient to make an examination of the mixed milk by this method.

Physiological Conditions Influencing Cellular Content of Milk.—Any physiological influence which may affect the secretion of milk will also probably influence the cell-content.

Breed of Cow.—Other things being equal, such as age of cow, time which has elapsed after calving, &c., it appears that normal cows of different breeds have different proportions of cells in their milk; a thoroughbred Hereford (Fig. IV.) gives a cell-content of the milk which differs from that obtained from a thoroughbred Shorthorn (Fig. VI., L.F.Q.), and these, again, both differ slightly from the cell-content of the milk of a Welsh heifer. In the Hereford heifer the cells are of large mononuclear lymphocyte type. Large mononuclear leucocytes also appear to be present invariably in the milk from Hereford cows, but are not so noticeable a feature in the films prepared from the milk of the cows of the other breeds. The Welsh heifer's milk always contains many—indeed, they were almost the most noticeable feature—of the very small blue cells, which are almost entirely absent from the Hereford cow's milk. Owing to the large number of these small cells, the cellular content of the Welsh heifer's milk is always high. In the milk of the Shorthorn, the very small cells so familiar by their presence in the milk of the Welsh heifer are here seldom met with: their place is taken by cells with a pale-blue nucleus and a surrounding layer of granular protoplasm, the granules being very fine and staining blue. This divergence of cellular content still requires explanation.

Influence of Calving on Cellular Content.—It is well known that the colostrum obtained from the udder immediately and for a definite time after the cow has calved, differs very considerably from ordinary milk in its chemical composition, in its fat ratio, and in its cell content. It is yellow and viscid, has a strong odour, and coagulates on boiling. Besides the colostrum corpuscles—i.e., cells laden with fat globules probably derived from the epithelium of the acinus the polymorphonuclear cells are very numerous, some staining sharply, others vacuolated and evidently in process of disintegration. These colostrum corpuscles appear in such great numbers that the stained film appears quite pink, in this respect differing markedly from the film of the ordinary milk, which has a blue tinge. Lymphocytes, both of the large and small variety, though present, are not numerous; the cell with the pale-blue nucleus and granular protoplasm (with fine blue granules) predominates. The polymorphs, even in colostrum, are actively phagocytic. As the milk becomes normal the colostrum corpuscles and the polymorphonuclear cells gradually disappear; and, if no inflammatory process supervenes, the milk cells soon return to their normal count. If, however, by any chance one quarter of the udder becomes inflamed, the polymorphonuclear variety of cell persists, and is present even when the milk from the other quarters affords no trace of its presence. When one compares films prepared from milk yielded by a cow a day or so after calving with those of normal cows—e.g., Shorthorn, Clara, Hereford, and Welsh heifer—one is struck by the difference of cellular content. The colostrum corpuscles gradually diminish in number, become less distinct, and disintegrate. The polymorphonuclear cells in colostrum stain well as a rule; but towards the third or fourth day these also show active signs of disintegrating. The blue cells—the lymphocytes—are prominent throughout the whole period of colostrum production, and continue present during the transition period.

Effect of "Stage of Milking" on Cellular Content.—The first milk drawn off, usually spoken of as the fore milk, is the fluid which fills up the teat canal and the milk sinus, and usually contains fewer cells than the milk drawn off later. The sediment left in the tubes in the various centrifuge samples is, as a rule, greatest in the strippings, and one is inclined to generalise and to say that the greatest number of cells is present in these strippings. This, however, is not invariably the case.

As a rule, unless a method of milking such as the use of a milk tube is employed, the cells of all three samples are much the same as regards both type and proportion, although the absolute number may vary considerably.

Effect of Time of Milking and Intervals between this Operation on the Cellular Content of Milk.—If the interval between the morning and the evening milkings be prolonged unduly the cells increase in number, especially the polymorphonuclear cells and the red blood corpuscles; the longer the interval between these milking periods the more the udder becomes distended; the vessels become very congested, and in extreme cases, although the milk may have been normal before the distension occurred, the stained films show masses of sharply stained normal polymorphs considerably in excess of what should be present in normal milk. Fig. II., cow 9, is from a film prepared from the sediment separated from the milk of a cow whose calf had been kept away from her during one night and part of the next day. The udder was greatly distended and yielded an abnormal quantity of milk, which presented no unusual appearance to the naked eye. Polymorphonuclear cells are seen in great numbers and appear to have retained their shape; the granules stain well, and the nuclei are distinctly lobed. Red blood corpuscles are also present in fair numbers, but there is a distinct paucity of the blue cells, both large and small. The conditions in this case were very remarkable, and were certainly due to the congestion following the long interval between milking.

Relationship between the Fat Content and Cellular Content of Milk.—In no case have I found any increase in the fat content of milk where there has been a rise in the polymorphonuclear cells. The statement made by Pennington and Roberts[1] that "in almost 75 per cent. of the herd, perfectly healthy, clean cows show *pus* at the close of the milking period and a *coincident chemical analysis*, that the percentage of butter fat is from 0·5 to 1·5 per cent. above the normal for that particular individual," is certainly not borne out by the results obtained during the present investi-

gation. The cells met with in drying-off cows appear to be epithelial in type and derived from the walls of the acini.

When these cells are present the fat content rises, whilst, as will be seen from the following experiment the fat content, instead of rising with the presence of pus, actually diminishes. A goat which was in full milk had one quarter of the udder injected with 10 c.cm. of an emulsion of streptococci before the time for evening milking, and was not milked until the following morning. Films were then prepared as described above, and the milk was analysed chemically. The yield of milk and the quantity of deposit (which in this case consisted entirely of cells and streptococci) and the amount of fat present are given in the following table :—

Fat Content and Cellular Content of Milk.

Date.	Time of milking.	Amount of milk from— Right quarter.	Amount of milk from— Left quarter.	Fat per cent. Right quarter.	Fat per cent. Left quarter.	Cell content. Right quarter.	Cell content. Left quarter.
		c.cm.	c.cm.			c.cm.	c.cm.
Feb. 27	Morning	52·5	9·9	6·95	3·11	—	—
	Evening	25·0	4·8	6·75	3·46	0·02 in 2·5	0·5 in 2·5
,, 28	Morning	64·0	11·85	5·1	4·46	0·03 in 8·0	0·4 in 2·5
	Evening	23·0	5·1	6·0	5·99	0·03	0·2
March 1	Morning	77·0	17·0	5·4	4·95	0·05 in 8·0	0·2 in 5·0
	Evening	10·5	2·5	7·71	3·04	0·01	0·13 in 5·0
,, 3	Morning	98·5	19·0	4·3	2·09	0·05 in 3·0	0·03 in 3·0
	Evening	35·0	6·5	3·45	3·24	0·05	0·03
,, 4	Morning	101·0	21·0	3·5	3·25	0·05 in 3·0	0·03 in 3·0
	Evening	31·0	7·0	—	—	0·25	0·01

It will be seen that where, as in the normal quarter (R.Q.), the amount of milk produced and the deposit thrown down remained normal in amount, in the infected quarter (L.Q.), although the yield of milk was much reduced, the deposit was greatly increased; but that the fat content, though normal in the unaffected quarter, rapidly decreased in the quarter which had received the injection of streptococci and had the larger deposit; the larger deposit being due entirely to the enormous increase of polymorphonuclear leucocytes which had all the appearance of pus cells. As the quarter gradually improved and became normal, the deposit decreased, the cells of the polymorphonuclear variety became less numerous, and the fat content again approached normal. When in acute infections of the udder true pus is produced the fat content of the milk invariably falls.

Nervous Excitement.—Nervous excitement undoubtedly has a marked effect on the milk yield of cows, but I have been unable to observe any marked change in the cellular content of milk, such as may be attributed, solely, to this cause.

Physiological "Drying-Off."—"Drying-off" should be a perfectly natural physiological process, but in some cases it may be due to pathological causes. In the normal animal when drying-off occurs the increase in the number of cells comes on quite gradually; the milk yield slowly falls off, and with this there is a corresponding increase in the number of cells, especially of one definite type. The films all present common features, and with a little practice it is possible to make a diagnosis of drying-off with great confidence. Should no differentiation be made between the various cells the condition would be diagnosed as due to previous disease, probably chronic inflammation of long standing. These drying-off cells, however, are usually circular in outline; the cytoplasm, which is often "vacuolated," contains no granules, and takes on an irregular somewhat deep pink stain. The nucleus may be single, or may be bi- or even tri-lobed, with the lobes apparently not joined together. The one, two, or even more "vacuoles" present in a single cell are stained by Nile blue, and therefore contain fat. The condition is well shown in Fig. V. of red cow, R.F.Q.

Pathological "Drying-Off."—The drying-off process may, however, be due to some pathological condition. Any severe inflammatory trouble may result in drying-off of the quarter or quarters affected. The cells are then of several varieties, the polymorphonuclear form being found in equal or even greater numbers than those described above as usually present. The inflammatory process introduces an extra factor, and may alter the cellular content to such an extent that the deposit may now be described as pus. If, however, the quarter be not severely affected, and resumes its normal function, the natural drying-off process supervenes, and the cells characteristic of that condition predominate, accompanied, however, by some polymorphonuclear cells which remain as evidences of the inflammatory process.

Sterile Milk.—It is almost impossible, from a perfectly normal heifer, to procure a sterile sample of milk. I have attempted to obtain such a sample by adopting the following procedure: The cow was placed in a large operating theatre, the floor of which was kept moist with a 3 per cent. solution of lysol. The udder and flanks were then washed and kept moist with the lysol solution, and the udder, previously washed with soap and warm water, was sponged with ether, after which the teats were again carefully wiped with sterile cotton wadding wrung out in the lysol solution. A stream of milk was then withdrawn by hand (the hands having been carefully washed and disinfected) before a sterilised milk tube was passed up the teat into the milk sinus. The milk tube connected by a piece of rubber tube to a sterilised flask (the whole having been previously sterilised as one piece) allows the milk to pass readily into the flask, which was taken to the laboratory at once and a series of plates made. Various colonies of streptococci grew as a rule, although in some cases the plates did remain sterile. It seems probable, therefore, that, in a cow which has suffered from mastitis, the infecting organisms remain in the milk ducts and sinus, live a saprophytic existence, and induce by chemiotactic influence the presence of the polymorphonuclear cells.

Pathological Conditions Affecting Milk-supply.

External Injury.—The cellular content of the milk of any quarter of an udder which has received some external injury may or may not be altered.

Abscess Formation.—A case of a slight superficial abscess came under my notice, which was opened and gradually healed, but during the time the case was under observation there was no alteration in the cellular content of the milk. If an abscess be deep and has infiltrated the gland, its presence is at once shown by the increased number of phagocytic cells; if acute, the phagocytic activity of the numerous cells is marked, if chronic and beginning to be shut off by fibrous tissue, the polymorphonuclear cells are less numerous, and less sharply defined. The other cells do not appear to be increased in numbers under these circumstances.

Experimental Inflammation.—This was done on a goat, an injection of an emulsion of streptococci being made into the L.Q. The milk from both quarters was carefully examined the day after injection, when it was found that the films from the milk of the R.Q.

remained the same as before the experiment, while those of the infected L.Q. were crowded with polymorphonuclear leucocytes. Many were actively phagocytic and had engulfed the streptococci, but many were in various stages of disintegration. It is interesting to note that the R.Q. presented no signs of any inflammation, and yielded the same quantity of milk with the same cellular content; whilst on the third day the infected quarter almost ceased to yield any. The observations were discontinued after the sixth day, when the infected quarter still gave an abnormal cell count, although from its clinical appearance one would have said that it had returned to normal.

Phagocytosis.—That the polymorphonuclear cells described above were actively amœboid and phagocytic was demonstrated in the following way. Within half an hour of milking a drop of milk was placed in a small glass chamber made by placing a ring of plasticine on a glass slide and covering it with another slide. The chamber, full of fluid, was incubated for ten minutes. The slides were then pulled apart, the plasticine ring removed, and warm normal salt solution poured gently over the slides to wash off the milk and the excess of cream; the slides were then allowed to dry and were stained by Jenner's method. The film which adheres to the upper slide is composed of wandering cells which have by their active movements made their way to the top of the chamber, while the tissue cells, together with inactive wandering cells, were found in the film on the bottom slide. The film on the top slide was composed of polymorphonuclear cells entirely, many of them actively phagocytic, while the bottom slide was covered with a film of blue cells, consisting of lymphocytes and epithelial cells with a few polymorphonuclear cells badly stained. The milk from the normal quarter treated in the same way left the upper slide entirely devoid of cells, but adhering to the bottom slide, however, were cells of all varieties. This differential arrangement seems to be a striking proof that the polymorphonuclear cells found on the upper slide are none other than the actively amœboid phagocytic cells of the blood, these being probably called out into the milk spaces by an irritant which has tended to set up an inflammation.

The cells then found in the sediment are almost all of one variety, large blue oval or round cells with granular protoplasm, and with a large delicately stained nucleus. They are not phagocytic nor amœboid, and when the modified Ponder's method is employed are found adhering to the bottom slide of the chamber. The whole subject of milk production is here involved, and it is highly probable that experiments carried out along the lines described above may give the key to the solution of a very vexed question. At all events the above experiment seems to indicate that one of the constituents of the cellular content of milk is derived from the tissue cells of the acinus, and that under special stimulation the numbers of this cell are increased, the special blood cells persisting in their original and normal proportion.

Source of Cells Found in Milk.—It is held very generally that all the cells found in milk are purely blood cells, but Winkler[5] and his school maintain that they are entirely of epithelial origin. On the one hand we have such statements as the following: "The outstanding feature in the examination of some hundred films prepared both from normal cows at different periods of lactation and from cows presenting slight signs of mastitis and representing many thousands of cells, is that *no cell having any decided resemblance to a polymorphonuclear leucocyte has been detected*, and phagocytosis of bacteria present is conspicuous by its absence." (Hewlett, Villar, and Revis.[6]) It is obviously difficult to concur in this view, the polymorphonuclear cells described in this paper being identical with those found in the blood.

These leucocytes must be regarded as pus cells when in the course of time they break down and disintegrate. The slightest inflammation of the udder is followed by the appearance of a considerable number of these cells whose characters are always the same, and whose phagocytic activity, when examined fresh, can be demonstrated. Many of my drawings show this very clearly, and I cannot agree with those observers who say that phagocytosis "is conspicuous by its absence." I am, however, in agreement with those who point out that the cell with a single oval or rounded nucleus, which stains well but not always uniformly, the cytoplasm of which is structureless and which stains well with eosin, is derived from the secretory layer of the gland tissue. This cell, which I regard as epithelial in type, is present in large numbers when the gland tissue ceases to perform its proper function as the cow "dries off." On account of its sometimes having a double nucleus it is apt to be mistaken for a polymorphonuclear cell, and by many authors it is regarded as a pus cell. The small blue cells described above as lymphocytes are really the lymphocytes of the blood-stream. Again, the coarsely granular eosinophile cells and the basophile cells which are so often present in milk undoubtedly correspond to similar cells found in the blood.

The other cells are epithelial in type, while a few are undoubtedly derived from lymphoid tissues.

Presence of the Red Blood Corpuscle in Milk.—It would not be accurate to say that *every* sample of milk contains red blood cells, but it is undoubtedly true that 99 per cent. of the milk samples which I have examined have contained erythrocytes. Even in normal milk—using the term in its strictest sense—I have met with an occasional red blood corpuscle. In acute congestion of the udder red corpuscles make their appearance, and they are always present also in the first milk or colostrum after calving.

Causes of the Presence of Blood in Milk.—The commonest cause of the presence of blood in milk is said to be rupture of a blood-vessel. This may be true where large numbers of erythrocytes are met with, but it is certainly not the case where the blood is detected only on microscopic examination of the milk. Apart from pathological and mechanical sources of blood it is not generally recognised with what ease the red blood corpuscle can get into the milk-stream, and the fact that this can occur is undoubtedly a factor to be taken into consideration when one considers the possibility of pathogenic organisms—e.g., the tubercle bacilli getting into the milk-stream by the same route.

So far as these observations go it is evident that the cells in milk are partly blood cells, partly lymphoid, and partly epithelial. While it is impossible to agree with the statement that "no cell having any decided resemblance to a polymorphonuclear leucocyte" is present in milk, it is obvious that to concede that all the cells in milk are pus cells is equally out of the question. Although it must be admitted that at certain times, and under certain conditions, pus cells are found in milk, it does not by any means follow that, whenever the cell count is high, we are dealing with a purulent condition.

I have endeavoured to point out that although reliance cannot be placed upon a quantitative leucocyte standard, yet, by means of the differential count, it is possible to distinguish all the various conditions most accurately, and in many cases even to make a diagnosis, and to set up a qualitative standard which may be of great service. It is, indeed, necessary not only to modify the existing standards, but to revise our whole method of diagnosis. The method described in this paper, together with the results of the investigation, indicates a method of procedure which certainly promises to give more satisfactory results as regards diagnosis than have yet been obtained.

Summary.

It is possible by means of a differential stain to distinguish very accurately the various kinds of cells found in milk. Without this it is impossible to place any reliance on so-called cell counts, as an indication of a diseased condition of the udder.

By studying the relative number and types of cells in a milk film, it is possible to make an accurate diagnosis of the condition of the quarter of the udder from which the milk is obtained, and also to ascertain

whether at any previous time that quarter has been involved in inflammatory trouble.

It is also possible to detect the process of "drying off" in cows. The cells appearing in the milk during that phase being tissue cells, are easily distinguishable from the inflammatory cells—the polymorphonuclear variety.

The different cells found in milk are classified and described.

It has been pointed out that the quantitative cellular examination of milk fails because it is impossible to detect small numbers of cells when the milk is greatly diluted; nevertheless, the differential count will often draw attention to some special feature and indicate the desirability of further investigation. The differential count reaches its highest value when used for the examination of milk from individual cows, and especially of the separate quarters of the udders of such cows.

Again, much valuable information can be obtained by examining the milk from each quarter, as fore milk, middle milk, and "strippings." Usually the strippings contain the greatest number of cells, but there are notable exceptions to this rule. The amount of deposit from these samples does not always give an indication of the number of cells present.

The various factors influencing the cellular content of milk have been considered under the following heads:—

Physiological.

1. The breed of cow seems to be an important factor, for by careful examination it is possible to determine from amongst normal animals of several breeds the source of the milk sample.

2. The effect of time after calving, together with the changes in composition of the milk from colostrum to normal fluid have been noted and discussed.

3. The intervals between milking, together with the time of milking, have been shown to be factors of considerable importance in determining the cellular content of milk.

4. The question of the relation of the cream content to the cellular content shows that there is a very constant relationship between the two; with an increase of certain cells the cream may also increase, whilst with the increase of other types of cells it is decreased. An increase of inflammatory cells is invariably associated with a low cream content, but it by no means follows that the converse is true.

5. The drying off process is associated with a definitely increased output of cells, essentially different from the polymorphonuclear variety. They are tissue cells, and are not associated—as some authors maintain—with an outpouring of pus in this condition.

Pathological.

We have seen that the cellular content of milk is profoundly altered under pathological conditions. Of these: (1) some previous illness—e.g., milk fever, mastitis; (2) abscess formation involving the gland tissue; (3) streptococcic infection, whether naturally acquired or by experimental injection.

The different cells which predominate under these varying conditions have all been referred to.

Mechanical.

Lastly, the mechanical factors which influence the cellular content of milk have been reviewed and discussed.

In conclusion, it is frequently stated that milk containing pus cells is unfit for human consumption. It is therefore of the utmost importance that we should be able to determine the presence of pus in milk. If it is true that it is impossible to distinguish between a pus cell and a leucocyte, it is obviously of no use to use a numerical method of counting all the cells in a given sample of milk. The only method of distinguishing a pus cell from a normal leucocyte is by means of a differential stain and a differential count, when their presence may be readily enough detected.

(*Continued at foot of next column.*)

A CASE OF LEPROSY.

TREATED BY A VACCINE PREPARED FROM A NODULE FROM THE PATIENT'S ARM.

BY SIR NORMAN WALKER, M.D. EDIN.

With a Note on the Preparation of the Leprosy Vaccine by Lieut.-Colonel GLEN LISTON, C.I.E., I.M.S. (Ret.), *and a Note on the Histology of the Case by* J. W. DAWSON, M.D., F.R.C.P.

(*With Coloured Plate.*)

Mrs. F——, a Russian Jewess, aged 70, came to Scotland from Kovno over 40 years ago and has lived here ever since. She has been married for 52 years and has had two children, both of whom are alive and well. She states that up to four years ago she was in perfect health and had no eruption on the skin. I have questioned and cross-questioned her; I have had the assistance of the Rabbi, and her statement remains unshaken. I have tried to ascertain whether she had had living with her for any length of time compatriots from regions where leprosy is endemic, but no evidence of this is forthcoming. She cam the Royal Infirmary, Edinburgh, in January, 1923, when she presented the appearance shown in the photograph (see figure). The appearances on the face are, of course, characteristic of leprosy; the nodules were, so far as my experience goes, rather larger and redder than usual. It is, as all who have had to deal with this disease know, a common experience that a good deal of tact is required in the admission of such patients to a hospital ward, and it was some time before I thought the conditions were suitable.

She was admitted to my ward on August 24th, 1923. Nodules were excised at different stages for microscopic examination, and the findings are described later by Dr. J. W. Dawson, histologist to the laboratory of the Royal College of Physicians of Edinburgh. A few days after her admission she was put on injections of chaulmoograte of sodium, and these were continued for three or four weeks, an injection being given twice weekly. The pain, however,

(*Continued from previous column.*)

THE CELLULAR CONTENT OF MILK: REFERENCES.

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FIG. I.

FIG. II.

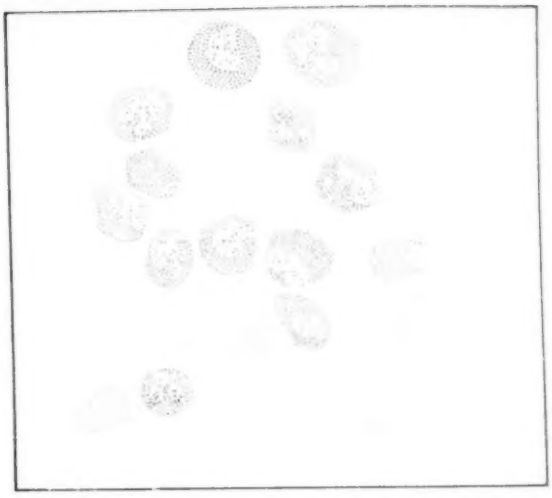


FIG. III

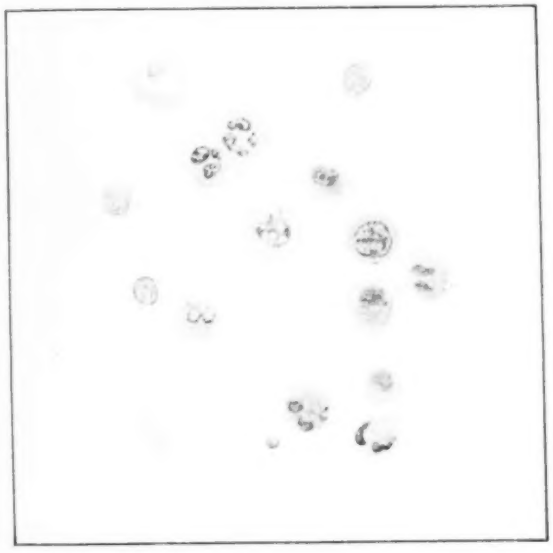


FIG. IV.

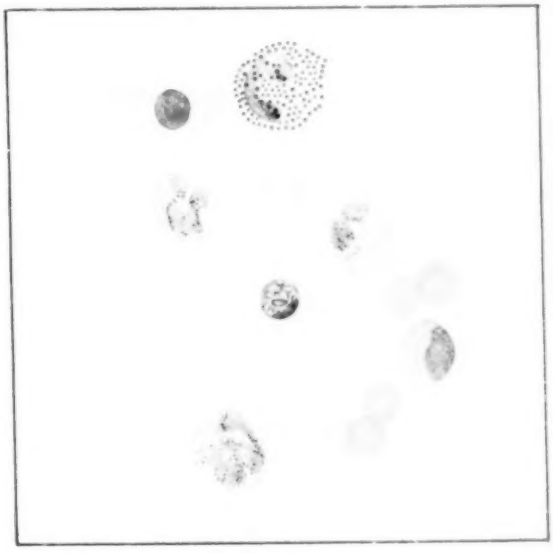


FIG. V.

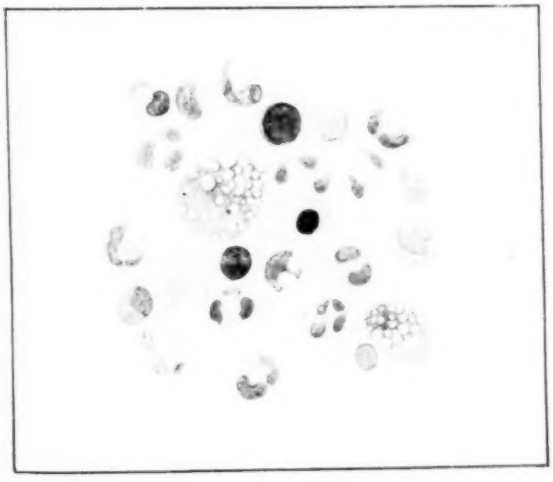
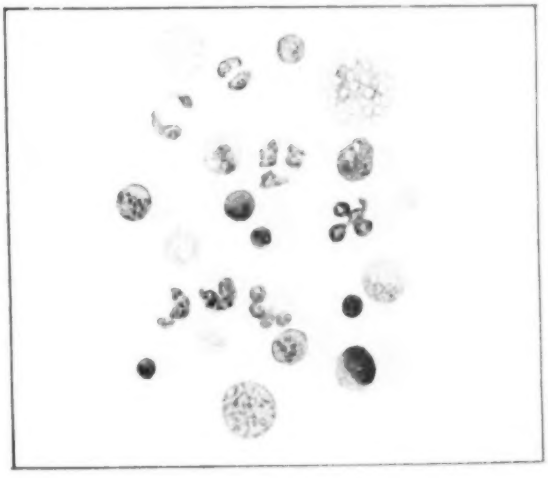


FIG. VI.



DR. P. C. VARRIER-JONES: THE CELLULAR CONTENT OF MILK.

SIR NORMAN WALKER: A CASE OF LEPROSY.

was very severe, and although she was in every way an admirable patient, her sufferings were evidently too great to warrant one in continuing the treatment.

For several years I have been treating most of my numerous cases of lupus with a vaccine prepared direct from tuberculous glands (either human or bovine) according to the method suggested by Dr. McGowan and Mr. John Fraser, with, I am convinced, very excellent results; and it occurred to me to try a similar method in this case. (See Col. Glen Liston's note below.) From October an injection was given weekly, and the first cast was taken on Oct. 4th. No pain was associated with the injection and the poor old lady's gratitude for this was quite touching. Within three weeks improvement was noticeable, and it proceeded with accelerated strides until the whole eruption had reached the stage shown in the second of the coloured casts, which was taken on April 22nd, 1924. The improvement is indeed so striking that it is not necessary to occupy space in describing it. Her general condition has improved, though at no time did she show any marked deterioration of health.

I have come across one or two references to the treatment of cases by vaccines made from the nodules, but in none are there details of such encouraging improvement as has occurred in this case. I hope others with larger opportunities will give the method a trial. Nearly 40 years is a long period of incubation, but I believe a period as long has been noted, and there does not seem to be any other explanation for the occurrence of the case. No bacilli were found in the nasal secretion.

NOTE ON THE PREPARATION OF THE LEPROSY VACCINE.

By Lieut.-Colonel W. GLEN LISTON,
BACTERIOLOGIST TO THE LABORATORY OF THE ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH.

A nodule on the skin of the forearm having been selected, the skin was thoroughly cleansed with alcohol and ether. Ethyl chloride was used to produce local anæsthesia and the nodule, having been cut out with aseptic precautions, was placed in a sterile vessel and removed to the laboratory. Here the nodule was cut into small pieces and then ground up with sterile sand in a mortar, a little normal saline being added gradually till a thick emulsion was produced. The emulsion was decanted into a sterile test-tube and allowed to stand till the heavier particles had settled. The supernatant cloudy fluid was decanted off into another tube and then examined microscopically.

It was found to consist, for the most part, of leprosy bacilli with a small quantity of cellular debris. The majority of the bacilli were present in clumps of two or more elements, so that attempts to count the number of bacilli present in the emulsion gave rather irregular results. The emulsion thus prepared was heated for half an hour at 60° C., and when diluted with carbol saline constituted the vaccine. The vaccine was put up in 1 c.cm. capsules of such a strength that approximately 200 million leprosy bacilli were present in each c.cm. The first dose recommended was 0·1 c.cm., which could be increased as indicated by the condition of the patient. She is now receiving 1 c.cm. weekly.

NOTE ON THE HISTOLOGY OF THE CASE.

By J. W. DAWSON,
HISTOLOGIST TO THE LABORATORY OF THE ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH.

The sections of the earlier nodule show the presence of a very cellular granulation tissue occupying the superficial layers of the corium, with a slight infiltration of the deeper layers, especially along the lines of the vessels. The cells are closely placed together and consist of (1) small, rounded or oval forms, with a comparatively large, deeply-staining nucleus; and (2) large mononucleated forms in large numbers—the so-called "lepra cells"; these are fusiform or rounded and have a vesicular nucleus and often a vacuolated protoplasm. A few large cell forms with several nuclei are present, but no cells similar to the giant cells of tubercle. The actual stroma is very delicate and there are numerous thin-walled capillaries, so that there is no necrosis and no caseation. In sections stained specially for the leprosy bacillus, the large "lepra cells" are found packed with rod forms in characteristic groups, while many bacilli are present free in the tissue spaces and a few in connective-tissue cells.

The sections of the later nodule, after treatment, show that the tissue is more fibrous and much less cellular. Many of the larger cells are present, but are of a fibroblastic character. Under the low power there is a suggestion of an early focal necrosis of the cells, and the small-celled infiltration of the efferent perivascular lymphatics is less marked. In sections stained for the bacillus, a few typical "lepra cells" are still present containing rod forms, but the great majority of the large cells present contain only vacuoles or granules of varying size. The granules are present also free in the lymphatic spaces, and both within and without the cells may fuse to form small masses. As the staining reaction of the granules is similar to that of the rods, the appearances are strongly suggestive of the granular disintegration of the bacilli and are quite distinct from that of the eosinophile cell granules present.

Summary.—In the early nodule the structure is that of a cellular granulomatous tissue and the bacilli are present entirely in rod form within the "lepra cells" and free in the tissue spaces. In the later nodule there is (1) a building up of a granulation scar tissue; (2) a breaking up of the bacillary rods into granules (the "globi" of Hansen) and their gradual disappearance.

THE ACTION OF QUINIDINE IN THE TREATMENT OF HEART DISEASE.

BASED ON THE EXPERIENCES OF CERTAIN MEMBERS OF THE CARDIAC CLUB.

BY JOHN HAY, M.D. MANCH., F.R.C.P. LOND.,
SENIOR HONORARY PHYSICIAN, ROYAL INFIRMARY, LIVERPOOL; PROFESSOR OF MEDICINE, LIVERPOOL UNIVERSITY.

AT a meeting of the Cardiac Club in Edinburgh in 1923 there was a discussion on the value of quinidine in fibrillation of the auricles, and the members gave their varied experiences. It was suggested that it would be of some interest and value if this experience could be pooled. A questionnaire was accordingly drawn up and sent to each member, requesting information concerning the method of administration, the type of case, the nature of response, and the occurrence of any toxic effects or misadventures during the exhibition of the drug,* and the results were presented in the form of a report to the next meeting of the Club at Bristol in June, 1924.

As the administration of quinidine has become a not uncommon method of treatment in fibrillation it was thought that the publication of the results might be of service.

On attempting to analyse the figures received it was clear that only simple grouping was possible if the results were to be pooled. The cases have accordingly been arranged under three headings:—

(1) One hundred and sixty-six patients suffering from auricular fibrillation and V.D.H. (2) Eighty-seven patients suffering from auricular fibrillation but no V.D.H. This group included patients with arterio-sclerosis and myocardial degeneration, high blood pressure, syphilitic disease, and others in whom the condition of the heart muscle was not stated. The presence of mitral incompetence was not considered in itself as justifying a diagnosis of V.D.H., and such patients were included in this group. (3) Twelve thyrotoxic cases and those with Graves's disease; giving a total of 265 patients.

* The following are the members from whom replies were received: J. C. Bramwell, T. F. Cotton, C. F. Coombs, John Cowan, J. G. Emanuel, F. R. Fraser, John Hay, C. E. K. Herapath, J. F. Macliwaine, J. Parkinson, W. T. Ritchie, J. Starling, and K. D. Wilkinson.

Method of Administration.

This has varied considerably, and may account for the striking difference in the quality of the results obtained.

The schedules show clearly that in most successful cases the total amount of quinidine required to obtain a sinus rhythm is not large. From 1 to 3 g. is frequently sufficient, although sometimes massive doses continued over some days may succeed when the more usual dosage has failed.

The following may be taken as samples of the methods employed:

1. F. 5 gr. ter in die, increasing to 7 gr., and later to 10 gr. ter in die.

In cases that did not respond well to digitalis and in other ways were not quite straightforward, a trial dose of 2½ gr. or 5 gr. was given.

2. R. First day, 0·2 g. twice daily; second day, 0·2 g. thrice daily; third day, 0·4 g. thrice daily; fourth day, 0·4 g. thrice daily; and so on until the tenth day, when the drug is stopped if fibrillation persists.

3. C. C. 5 gr. (0·3 g.), five doses in 24 hours = 25 gr. in four days.

Digitalis is given first to slow down the heart, and is sometimes given concurrently with the quinidine.

4. B. Initial dose, 0·2 g.; 24 hours interval, followed by 0·4 g. t.i.d., increasing, if necessary, until received 0·4 g. six times a day = 2·4 g.

5. H. After initial tentative dose of 0·2 g., 2 g. is given in 24 hours in ten doses of 0·2 g., conveniently spaced. This may be increased to 3 g. per day, by doubling the amount of the quinidine in five of the ten doses given in the 24 hours.

Before the administration of the quinidine, digitalis is given if there is rapid action of the ventricles or signs of decompensation.

Treatment after the Resumption of Sinus Rhythm.

In this there is no uniformity. By some the dose of quinidine is gradually reduced and a history of palpitation or irregularity is considered as an indication to keep up the dosage for a longer period; or 0·2 g. are given twice daily for the first week, and 0·2 g. once daily for the next fortnight. Others have continued with the full dosage of quinidine whenever there is a liability to relapse, but even massive doses have failed to prevent the recurrence of fibrillation in some patients.

The general opinion is in favour of giving quinidine for some time after the restoration of a normal rhythm.

Consideration of Results of Treatment.

In each group the result is given under one of three headings:—

Failure.—Complete, in which the fibrillation persisted in spite of treatment.

Success.—Temporary. The quinidine succeeded in breaking the fibrillation, but after a few hours or weeks the auricles reverted.

Success.—Permanent. Where the normal rhythm had remained up to the date on which the schedule was sent off, or where the period of normal rhythm was of months duration.

It is hardly necessary to point out the difficulty in stating the number of permanent successes, or to give the figures truly representing the proportion of those who maintained a normal rhythm to those who reverted, because there is a constant tendency in these patients to revert to fibrillation.

Group 1.—Auricular fibrillation with V.D.H., 166 cases. Failure complete in 78; success temporary in 42, equals 120 ultimate failures; success permanent in 46. In this group of 166 cases the fibrillation was broken in 88 patients, or 53 per cent. In 42 patients the success was only temporary, which gives 120 ultimate failures and 46 successes.

Group 2.—Auricular fibrillation in hearts free from V.D.H., 87 cases. Failure complete in 28; success temporary in 24, equals 52 ultimate failures; success permanent in 35. This includes a variety of types of heart on which the fibrillation had been grafted, but the results are definitely better than in group 1. The fibrillation was broken in 59 patients, or 64 per cent.

In group 1 the percentage of permanent successes is only 27·7 per cent.; in group 2 the percentage of permanent successes is 40·2 per cent.

However, it is obvious that stress cannot be laid on these percentages, because there is no certainty about the persistence of the normal rhythm, and unfortunately sooner or later reversion is likely to recur in an indeterminate number of the patients.

In group 2 were included five patients in whom there was evidence of *markedly increased blood pressure.* In two of these the normal rhythm was maintained, in two the heart reverted to auricular fibrillation, and in one patient the normal rhythm was never attained.

There must be other instances of raised blood pressure, but they were not indicated in the schedules.

Group 3.—Including the thyrotoxic cases and Graves's disease. The number of cases reported is small, but the results are good. Cases in all, 12. Failure complete in 3; success temporary in 1, equals 4 ultimate failures; success permanent in 8.

The following are the combined figures for the 265 cases:—

Failure complete, 109; success temporary, 67, equals 176 ultimate failures; success permanent in 89.

Quinidine did, however, restore a normal rhythm in 156 of these patients, or in 59 per cent.; though in 67 the fibrillation returned.

Toxic Manifestations and Misadventures.

The administration of quinidine is not entirely devoid of danger, and not infrequently causes distressing symptoms. The reports received dealing with the toxic effects of quinidine and the possible misadventures associated with its exhibition are therefore particularly valuable, and cover 286 patients.

Certain minor results were not infrequent, such as headache, nausea, vomiting, diarrhœa, abdominal pain, giddiness, faintness, buzzing in the ears, general distress, a sense of apprehension, palpitation, præcordial pain, excessive ventricular rate, orthopnœa, sweating, toxic erythema, and urticaria.

Idiosyncrasy may be marked, and it is then impossible to push the drug—a tentative dose will discover this disability. It is rare, however, to meet with a sensitiveness so marked that treatment cannot be attempted. Slight unpleasant manifestations of discomfort should not be allowed to prevent a reasonable trial.

These manifestations and misadventures are given fully. This portion of the report deals with all patients to whom quinidine was administered, and includes those suffering from paroxysmal tachycardia and auricular flutter, in addition to the cases of auricular fibrillation.

Of the 286 patients dealt with in this section of the report eight died suddenly, and embolus occurred in seven. One of the deaths in this series (1) was apparently not in any way due to quinidine.

1. One patient died about 36 hours after a single dose of 0·3 g., probably because of violent mania (death due to psychical causes and not to quinidine).

2. Death sudden and unexplained. Embolism had not occurred.

3. Quinidine stopped after two days because of fainting attacks. Died two days later, suddenly, possibly ventricular standstill. Female, 60. Exophthalmic goitre. No V.D.H. Thyroidectomy.

4. Sudden death by failure of breathing after two doses of 0·2 g. Female, 30. Mitral stenosis.

5. Normal rhythm after 75 gr. of quinidine without any trouble. Reverted in three days. On the fifth morning of the second course of quinidine his physician entered the ward and found him asleep; while he stood by feeling the pulse the patient woke up, said he felt remarkably well that morning, and died. Male, 55. No V.D.H.

6. History of numerous attacks of fibrillation. During attacks patient felt ill, but was unaware of the rapid and irregular action. Rate of heart 180 or more. Radial pulse not palpable. Full doses of digitalis had no effect and as the attack has lasted over ten days, quinidine was given. She had about 60 gr. and died suddenly. Female, 34. Paroxysmal tachycardia.

7. Patient suffering from paroxysmal tachycardia. Quinidine was administered; 2 g. were followed by cessation of the paroxysm and everything was progressing satisfactorily, when suddenly, without warning, she died. No autopsy.

8. Sudden death. Ventricular fibrillation. Autopsy, no cause of death found. Male, 27. Rheumatic, mitral disease. With great enlargement of the heart.

The following are the details in the seven cases of embolism :—

1. Cerebral embolism—right hemiplegia. Onset eight days after restoration of normal rhythm. Recovery.
2. Pulmonary embolism. Three hours after restoration of normal rhythm. Recovery.
3. Cerebral embolism. Normal rhythm after 34 g. No material change in the subjective symptoms. Four days later, left hemiplegia, hemianæsthesia, conjugate deviation to the right; no loss of consciousness, no pyrexia. Normal rhythm maintained. Male, 37. Double mitral lesion of old standing.
4. Cerebral embolism. Rhythm normal after 0·6 g. Sixteen hours later right hemiplegia and aphasia. Reversion to fibrillation 28 hours later. Female, 45. No V.D.H. High blood pressure, large heart, and persistent tachycardia. No response to digitalis.
5. Embolism of right popliteal artery and gangrene of two toes occurred within 24 hours of reversion to normal rhythm. There was also a small patch of gangrene of the right ear. Male, 52. Flutter. Normal rhythm maintained for at least 12 months.
6. Embolism in the leg within six hours of reversion to sinus rhythm. No gangrene. Male, 29. Fibrillation.
7. Embolism in left brachial artery within 12 hours of resumption of normal rhythm. Female, 39. Early mitral stenosis. Fibrillation.

Symptoms of ventricular stoppage were noted twice :—

1. Adams Stokes attack. Ventricular standstill. Female, aged 31. Mitral stenosis. Ventricular rate 50–60. Recovered and reverted.
2. Adams Stokes syndrome after 1·1 g. Male, 31. Mitral stenosis.

Hallucinations of light with left-sided hemiplegia, lasting a few hours, occurred in a female of 52, suffering from mitral stenosis. The sinus rhythm was only temporary. This case might fairly be included in the series of embolisms.

In another patient, a female of 44, suffering from mitral stenosis, quinidine induced epileptiform attacks with cyanosis of the face, stertorous breathing, and twitching of the hands and face. The sinus rhythm was not maintained.

Such being the probability of obtaining a normal rhythm, and such the distress and liability to accident associated with the administration of quinidine, the question naturally arises: How far are patients benefited by the resumption of a normal rhythm, and in what particular type of case should quinidine be exhibited? In other words, when is it worth while?

Cases Unsuitable for Quinidine.

There are certain patients to whom it is admittedly unwise to administer quinidine.

1. It is more than probable that little or nothing is to be gained from quinidine in badly damaged hearts with old-standing valvular disease, and more particularly if there is undoubted failure of compensation with venous engorgement.

Here digitalis is the best drug to administer in the attempt to control the ventricular rate and improve the reserve power of the heart.

2. Occasionally, in a patient who has suffered severely from angina pectoris, the onset of fibrillation is followed by the cessation of the anginal pain, and it is a question whether one should attempt to restore a normal rhythm under these conditions.

3. Idiosyncrasy. Rarely the patient is unduly sensitive to quinidine, and to push the drug induces unpleasant or even dangerous consequences.

4. All cases of acute or subacute infective endocarditis.

5. A history of embolism would be a factor against the administration of quinidine.

Cases Suitable for Quinidine.

Quinidine is most likely to be of service when the fibrillation is of recent development, and when there is but little cardiac enlargement and no valvular disease; as, for example, a case of paroxysmal fibrillation with the last paroxysm persisting.

Another favourable type of case is that of a patient in whom the onset of fibrillation was due to, or at any rate associated with, an acute infection, such as influenza or the presence of an infective focus.

A man, aged 50, who gave a history of frequent sore-throats, suffered from an acute febrile attack. Fibrillation occurred and an embolus lodged in the popliteal artery. Gangrene of two toes began. Enucleation of the tonsils was followed by cessation of fever. Quinidine, 4 gr. four-hourly, restored the normal rhthym after treatment for four days. The normal rhythm has been maintained for the past five months.

When the onset of distress definitely dates from the inception of fibrillation, and it is clear that the abnormal rhythm is the disabling factor, then the advisability of administering quinidine should be favourably considered.

Quinidine has proved of great value in the fibrillation associated with exophthalmic goitre, especially where partial thyroidectomy has been performed and the fibrillation persists. Quinidine is also valuable before operation in the milder cases of Graves's disease in which fibrillation is present.

It is clear that each case must be considered on its merits. There are no hard-and-fast rules. Often the results are far better and more permanent than was to be expected—more frequently, however, they are disappointing. Either the fibrillation persists or the recovery is only temporary.

When it is permanent most patients are conscious of some change for the better. The symptoms are ameliorated and the cardiac reserve is increased. In favourable cases a normal mode of life is resumed.

The Effect of Return to a Normal Rhythm.

Quinidine is given with the hope that it will restore a normal rhythm. Even when it is successful the result is sometimes disappointing—there may be no appreciable advantage gained, and, in fact, the patients are sometimes unaware of the change of rhythm; either because the discomfort induced by the fibrillation was so slight or, as in the case of the gravely ill, the cardiac distress, irrespective of the fibrillation, is so great that the additional disability is not appreciated. As a rule, however, the return to a sinus rhythm is accompanied by some measure of relief, the distressing palpitation is removed, and the consciousness of the irregularity disappears; and as these two symptoms are enough to cause insomnia, their disappearance is followed by restful nights and consequent benefit. Improvement is great in the thyrotoxic cases, and in them especial emphasis is placed on the relief resulting from the cessation of palpitation. With the return to a normal rhythm there is usually an increase in the cardiac reserve, sometimes, indeed, so material that work is resumed. The patient finds that he can mount stairs with greater ease and can walk farther and faster.

A male, aged 62, with a much enlarged heart but no valvular lesion, whose auricles had fibrillated for at least six years, had been unable to work during the whole of this period. He required very large doses of quinidine before the restoration of normal rhythm six months ago. Since then he has followed his occupation of traveller.

Another case was that of a female, aged 50. Fibrillation followed influenza and had persisted for six months. Œdema, extreme dyspnœa, and tachycardia were present. Since the return to normal rhythm eight months ago she has been back at work.

There is some difference of opinion concerning the degree of improvement resulting from the administration of quinidine, and from the various reports it is obvious that there is an increasing tendency to give quinidine only to carefully selected cases. There is, however, remarkable unanimity as to its value in patients suffering from exophthalmic goitre and auricular fibrillation, for these patients are especially conscious of and distressed by the rapid and irregular ventricular action, and are correspondingly relieved and benefited by the return to the normal rhythm.

In conclusion, may I thank those who have supplied me with the data from which I have completed the report; a report, presented in the hope that the combined experience on which it is based may prove of service to the profession in the use of quinidine.

NOTE ON THE DETERMINATION OF SOLUBLE "PROTEIN" IN GASTRIC FRACTIONS FROM CASES OF CARCINOMA.

BY C. S. HICKS, M.Sc., M.B., CH.B.

(From the Pathology Department, Medical School, Dunedin, New Zealand.)

IT was originally shown by Wolff [1 2] that if the contents of a stomach after an Ewald test-meal were withdrawn, filtered, and tested for protein by a special precipitation reagent,* the normal stomach did not give positive reactions in such high dilutions as fluids drawn from a stomach affected with carcinoma.

For the same reasons that the Ewald test-meal is not so valuable as the fractional method of Rehfuss,[3] so it appeared to us that Wolff's method might be better applied fractionally, and, unaware of Clarke and Rehfuss's paper,[4] we carried out some tests. Although this is only a brief account of incomplete work done during routine examinations, we feel that there are one or two points worth drawing attention to, while at the same time focusing interest on a practical method which, as Rolfe [5] points out, is, however, imperfect at present, an additional aid to diagnosis in cases where every aid should be of value.

For the proper carrying out of the test, the test-meal—that of Ryle [6] was used in this series—is given on an empty stomach in the morning. The meal consists of two tablespoonfuls of oatmeal and a quart of water boiled down to one pint and strained through muslin. A sample of resting fluid is withdrawn before administering the gruel.

The specimens are filtered, and the filtrate diluted in a series of Wassermann tubes by addition of water. Thus, the first specimen is diluted 1 : 40, the next is made by adding equal volumes of the first to an equal volume distilled water, repeating up to the required limit in each case.

It was found that the ordinary gastric test-meal so examined seldom gave positive reactions beyond a dilution of 1 : 40, and never beyond 1 : 60 towards the end of digestion. In cases of verified gastric carcinoma the results were sometimes quite remarkable, while in all cases positive results were obtained in much higher dilutions than normal. This has been pointed out by Clarke and Rehfuss,[4] the difference being that they made use of the Ewald meal of tea and toast, and apparently were able to get positive tests for protein from the same in dilutions of 1 : 320 towards the end of normal digestion. This introduced a factor which they eliminated by taking as positive pathological tests only those which showed a rapid rise in soluble protein out of proportion to digestive activity. Although, using the Ryle test-meal, this difficulty was not apparent, their reservation is a good one for conservative reasons.

Next, cases in which obvious blood had escaped into the stomach were examined with a view to discovering whether the positive tests were due to serum protein. The results were interesting. In no case of gastric ulcer, with hæmatemesis, could the high figures common in carcinoma be obtained, and further, the results, plotted as a graph, were not comparable. On examining the fractions from carcinoma cases, by precipitation with ammonium sulphate, it was found that Wolff's reaction still occurred in the filtrate, and it was concluded that the causal factor is something of the nature of proteose. Why positive tests in carcinomatous stomachs should be obtained with achylia and achlorhydria is difficult to explain, especially when an actively secreting stomach with serum effusion from an ulcer does not give such high results. It is suggested that the neoplastic tissue in breaking down undergoes autolysis and digestion more readily.

No.	Rate of emptying.	Resting fluid.		Maximum.		Maximum "soluble protein."	Final total acid.
		HCl.	Total acid.	HCl.	Total acid.		
1	1 hour	0	15	0	15	1 : 480	8
2	2½ hours	0	10	8	25	1 : 640	15
3	1 hour	0	10	0	12	1 : 640	8
4	2½ hours	0	10	0	30	1 : 1280	10
5	1½ ,,	5	10	15	28	1 : 320	12
6	3 ,,	10	25	0	25	1 : 1280	20
7	3 ,,	2	16	8	15	1 : 280	3
8	4 ,,	0	40	0	13	1 : 640	11
9	3 ,,	5	28	4	22	1 : 320	10

The table shows data taken from fractional test-meal analyses in nine separate cases of carcinoma of the stomach. Time of emptying, as shown by rate of disappearance of food: acidity, both total and due to hydrochloric acid of the resting juice, and at the highest subsequent point reached during the test, together with the final total acid at three hours, are quoted. Maximum "soluble protein" figures represent dilutions giving positive tests at the end of the third hour—i.e., conclusions of test.

FIG. 1.

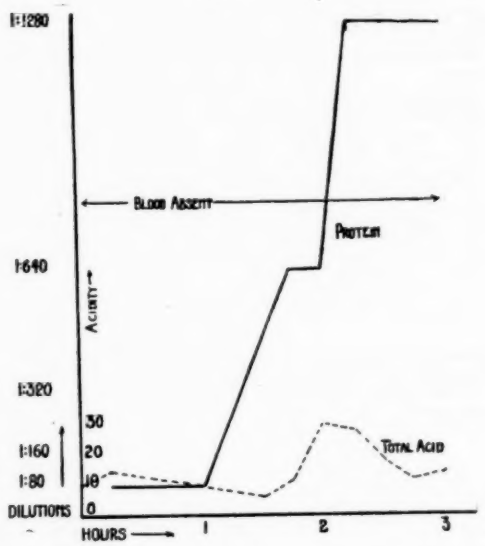
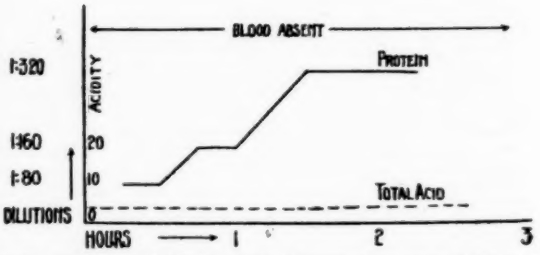


FIG. 2.



FIGS. 1 and 2.—Soluble "protein" curves from cases of gastric carcinoma.

Among the cases examined some did not come to operation for various reasons, and from those quoted which were verified either at operation or at autopsy there is not sufficient evidence to be drawn as to how the type of carcinoma affects the result. One case of fungating soft carcinoma of the pylorus gave results only up to 1 : 280—a figure reached in 90 minutes. The case came to autopsy (No. 7).

* Phosphotungstic acid reagent: Phosphotungstic acid, 0·3 g.; alcohol, 95 per cent., 20·0 c.cm.; concentrated hydrochloric acid, 1·0 c.cm.; distilled water to make 200 c.cm. Layer the reagent with great care, on the surface of the suspected fluid, by means of a fine-bore teat pipette. Examine against a dark background.

The graph Fig. 1 represents the result of a case of inoperable carcinoma involving the lesser curvature (No. 4), and Fig. 2, that from carcinoma of the body of the stomach with much glandular involvement.

Examples of gastric ulcer with much blood effusion are given as comparisons. In both the tubes were black with "coffee grounds," and hæmatemesis had been a marked symptom. One case shows an achylia and achlorhydria, the other an almost normal acid curve (free acid not represented diagrammatically), Figs. 3 and 4, in benign achylias, and those associated

FIG. 3.

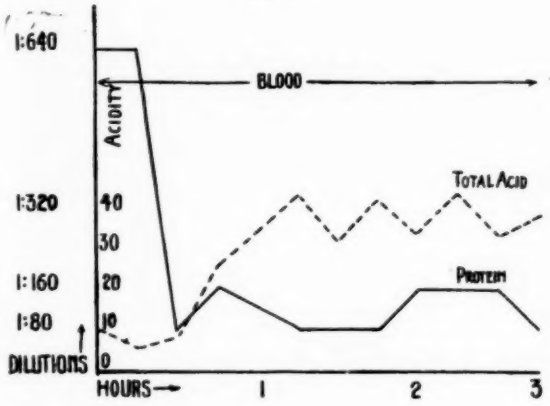
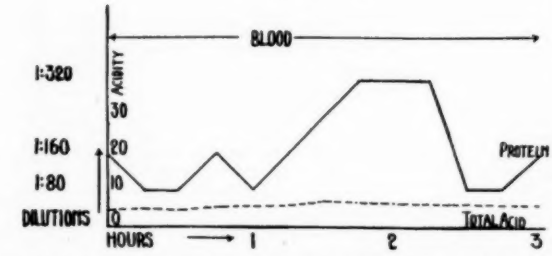


FIG. 4.



FIGS. 3 and 4.—Soluble "protein" curves from gastric ulcer cases.

with pernicious anæmia tests for soluble protein, could not be obtained in dilutions greater than 1 : 40, in all seven cases being examined.

In conclusion, Clarke and Rehfuss's[4] recommendation that before basing conclusions on the test all sources of protein from previous meal, from blood, and swallowed pus, &c., should be carefully excluded is a sound one, but blood effusions certainly do not give the same type of result as is obtained with carcinoma.

As it is difficult to express these results other than graphically, which method required space, it can only be stated that the gastric ulcer cases illustrated represent two of 11 separate cases studied.

Summary.

1. Serum effusion is not the factor involved in the Wolff Junghaus test for protein in gastric fractions.
2. The fractional application of the test gives results which help to distinguish a benign from a malignant achylia, and which merit closer attention in practice.

Literature.

1. Wolff: Berlin. Klin. Wochensch., May 29th, 1911, and 1912.
2. Einstein: Med. Klin., March 24th, 1912; also Wolff: Magen- u. Darmkrankh., Berlin, 1912.
3. Rehfuss: Amer. Jour. Med. Sci., 1914, cxlvii., 848.
4. Clarke and Rehfuss: Jour. Amer. Med. Assoc., 1915, lxiv., 1737.
5. Rolfe: Med. Rec., 1913, p. 848.
6. Ryle: Guy's Hosp. Rep., London, 1921, lxxi., 42.

(From the Royal School of Medicine, Cairo.)

SOME NOTES UPON BLOOD TRANSFUSION IN EGYPT.

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BLOOD transfusion has been performed by us on 42 occasions in the last four years in Egypt; in 30 instances the whole blood method has been adopted; in 12 the citrated method. The conditions for which it has been employed are as follows:—

1. *Primary hæmorrhage:* as a treatment following loss of blood due to severe accidents or operations, and as a preparatory treatment in cases of severe accidents necessitating such operations as double synchronous amputations above the knees or elbows.

2. *Secondary anæmias:* as a preparatory treatment for operations upon individuals suffering from a low hæmoglobin value of the blood, particularly the secondary anæmias of ankylostomiasis and bilharziasis, where extensive operations for some organic surgical conditions are necessitated. In this respect it is our experience in Egypt as elsewhere that extensive operations performed upon individuals with 45 per cent. hæmoglobin or less are almost uniformly followed by fatal results.

3. As a stimulus to *blood formation* in such cases as the grave secondary anæmias of ankylostomiasis and bilharziasis where, although the conditions themselves are cured, the anæmia persists. It appears that the blood-forming tissues have so long ceased to function that, even when the cause is removed, the effect persists. In such extreme cases as these, showing a 10 per cent. or 20 per cent. hæmoglobin, this anæmia continues until blood transfusion is undertaken. An immediate effect of raising the hæmoglobin to 60 per cent. or 70 per cent. is observed, followed in 10–20 days by a fall, and finally succeeded, after a month or two, by a rise to 85 per cent., which appears to be the normal for Egypt as compared with Europe. Our experience suggests that in whole blood there exist certain ferments or vital substances that stimulate the blood-forming tissues to the resumption of their function. In this respect we are in complete accord with E. L. Hunt and Helen Ingleby.[1]

4. In the treatment of *deficiency diseases*, such as diabetes, pellagra, and rickets, in order to supply vital substances which may temporarily or permanently stimulate the tissues at fault to resume their function. In pellagra we believe that blood transfusion is a most valuable remedy. Following the conclusions of Wilson[2] that pellagra is due to protein deficiency, and that the accompanying gastro-enteritis prevents the digestion of proteid food, we are of opinion that this is one of the possible means of supplying the deficiency. Whole-blood transfusion has been carried out in two cases of diabetes mellitus in young men; in one case with no effect upon the sugar tolerance, in the other followed by a normal sugar tolerance for 27 days, followed by a relapse to his original condition of hyperglycæmia. This and other results suggest that such vital substances as are transfused maintain a functioning existence or produce a temporary stimulus for about 20 to 30 days.

In the cases of men who give their blood we do not find that the loss of a pint produces any debilitating effect. The loss of a litre from a healthy individual on one occasion did not prevent him

[1] THE LANCET, 1919, i., 975.
[2] W. H. Wilson: The Diet Factor in Pellagra.

walking to his home after a short interval. During the war it was the experience of one of us (R. V. D.) that as much as 1 pint of blood could be removed on three different occasions from one particularly good donor in 48 hours with no ill-effect other than a slight rise in pulse-rate. The urgency for this course was extreme, and he was kept in bed for a week subsequently.

Blood Grouping in Relation to Grafting and to Blood Transfusion.

We find in Egypt that we can verify the observations already made elsewhere[3] as to the efficacy of blood grouping in skin and bone and organ grafting as well as the transfusion of blood. In cases where, for various reasons, autogenous skin and bone grafts are impossible, we find that skin and bone of Group IV. donors are successfully incorporated by their new hosts, whereas the transfer of tissue in the presence of cross-grouping has failed.

Dr. A. T. Shousha, of the serological department of the Government of Egypt, has grouped 417 Egyptian bloods. It is his experience that the proportion of Group IV. donors is low as compared with Europe. Of those potential donors that have been tested about 24 per cent. are Group IV., 14 per cent. Group I., 30 per cent. Group III., and 32 per cent. Group II. In this respect his figures agree with the results obtained by Hirschfeld in his study of the serological differences between the bloods of different races.[4 5] The biochemical race index of Egyptian blood is 1·07.

Blood Incompatibility in Relation to Race.

But we also find that there is no essential incompatibility in the blood of the various races in Egypt. The great majority of the rural inhabitants in Egypt are Egyptians, a race with very definite and fixed anthropological characters, brown skins and flat black hair. The type is as characteristic to-day as it was in Dynastic Egypt 2000 years B.C. The civilisations imposed from abroad upon Egypt in all the ages have largely vanished, but the fellaheen persist unchanged. There are three other racial elements most commonly met with in the cosmopolitan towns: the Negro, with woolly hair and coal-black skin; the Berberine or Negro-Arab, with less pigment in his skin and less kink in his hair; and the Levantine. The origin of the latter is uncertain, but he usually contains a mixture of Southern French, or Italian, Greek, Syrian, Turk, and Armenian grafted upon a Negro or Negro-Arab stock. We have successfully transfused blood in all these varying individuals and, on one occasion, we have successfully transplanted a bone graft from a Negro-Arab Berberine into the ununited ends of a fractured tibia of a fair-haired and grey-eyed Turco-Armenian.

There have been five instances of extreme and grave urgency where blood has been taken from untested donors and transfused. This condition is always liable to happen when the supply of tested donors fails in an emergency. In these cases it is our custom to give a small testing dose of blood as a preliminary and then to proceed after a few minutes to complete the transfusion. It was the experience of one of us (R. V. D.) in the war that, in similar circumstances of urgent need for transfusion, the blood of ungrouped grey-eyed and fair-haired Austrian prisoners from Transylvania agreed most excellently with wounded men of Scottish and north country regiments. The donors and recipients of blood were matched by colour before transfusion.

On the whole our preference is for the transfusion of whole-blood rather than citrated blood. We believe that the former functions more quickly and for a longer period, and that it appears to be a better oxygen carrier and to reduce the restlessness and dyspnœa of hæmorrhage more rapidly. But we have not observed any alteration in the coagulation time of blood after citrated blood transfusion nor any increased tendency to ooze in the case of lacerated wounds. In the war one of us transfused three patients suffering from gas-gangrene with the blood of recovered gas-gangrene patients, but with no marked results. We have had no experience with the transfusion of immunised blood in septicæmia as suggested by Almroth Wright.[6]

Effects of Transfusion of Incompatible Blood.

We have had no grave results from the incompatibility of bloods. There has been a certain train of definite symptoms which we attribute to incompatibility. The first is an irritable cough, of the same nature as we get so often in the bilharziasis outpatient department where ambulatory cases of this disease are treated by intravenous injections of tartar emetic. The next symptom which we attribute to incompatibility of blood is præcordial pain and distress. A high temperature with or without a rigor, after transfusion, is looked upon by us as evidence of incompatibility. It is perhaps due to the fact that our procedure is to stop the transfusion upon the supervention of these symptoms that we have had no fatal results. But we do find upon subsequent examination that in these incompatible cases the transfused blood has no good effect, and that blood pigment appears in the urine. It is probable that the gravity of the danger of incompatibility has been exaggerated; and we are of opinion that, in any case, there is no value in incompatible blood, especially as an oxygen carrier.

The two possibly communicable diseases for which we examine are syphilis and malaria. In this respect our attention has been drawn to a number of Egyptians who, without any clinical evidence whatsoever of syphilis, yet give a "doubtful positive" Wassermann reaction. Making all allowances for the personal factor in the bacteriologist who decides these tests, it is yet our belief that the universal parasitic diseases of Egypt, ankylostomiasis and bilharziasis, alone may be responsible for a modified positive Wassermann reaction. This point, however, is now under investigation. We have been unable to associate ourselves with the view that blood transfusion is of value only in cases of hæmorrhage. We have found that it is equally valuable in cases of surgical shock without extreme external bleeding. This is what we would expect if we regard surgical shock as due to bleeding into peripheral capillaries.

Conclusions.

The provisional conclusions at which we have arrived are:—

1. There is no essential incompatibility in the bloods of the various races of men in Egypt. There appears to be perfect mutual agreement between the transfused blood of Negro, Negro-Arab, Egyptian and Levantine races as well as that of fair-haired Turks or Circassians.

2. That we can verify the observations made in regard to the value of blood grouping in tissue transference, whether glandular blood, bone, or skin.

3. That the transfusion of blood is justified in grave urgency without preliminary blood grouping. Symptoms of incompatibility can be elicited by an initial infusion of a small testing dose of blood.

4. That the dangers of incompatibility of blood have possibly been exaggerated, but that incompatible blood is of no value as an oxygen-carrier, though good may result from the vital substances contained in it.

5. That we can also verify the observations made elsewhere as to the stimulation of blood-forming tissues to the resumption of their function, particularly in the persistent grave anæmias of bilharziasis and ankylostomiasis.

6. That blood transfusion is of value in surgical shock.

7. That there is possibly a great future for blood transfusion in the treatment of deficiency diseases.

[3] Geoffrey Keynes: Blood Transfusion.
[4] L. and H. Hirschfeld: THE LANCET, 1919, ii., 675.
[5] Shousha: Notes and Reports of the Public Health Laboratories, Cairo, 1924.
[6] Quoted by Alexander Fleming and A. B. Porteous, THE LANCET, 1919, i., 973.

A NOTE CONCERNING THE INCIDENCE OF GOITRE IN EGYPT.

AN ANALYSIS OF 216 CASES.

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AND

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SIMPLE parenchymatous or colloid goitre, with or without adenomatous or cystic degeneration, is extremely common in the valley of the Nile. Malignant conditions, also, of this gland show an incidence that can be compared probably with that of England or America in proportion to population. But disorders of secretion resulting, on the one hand, in hyperthyroidism or exophthalmic goitre and, on the other, in myxœdema or cretinism are almost unknown. Excluding the physiological goitres of puberty and of pregnancy we have analysed 216 cases of thyroid enlargement or derangement which have been admitted to Kasr-el-Ainy Hospital in the last five years. This hospital has 400 available surgical beds, a total in-patient state yearly of 13,000, an out-patient attendance of 120,000, and draws from the whole of Egypt.

We cannot, however, claim that these figures accurately reflect the incidence of goitre in the country, but they serve to give a fairly correct impression of conditions as they exist. But it can be safely estimated that only 1 in 10 of goitrous people seek medical aid for the condition. The patients come to us as a rule chiefly for cosmetic reasons, and only rarely on account of pressure upon the trachea. For these conditions 78 operations have been performed. The time-honoured local treatment applied, usually, by the village barber consists of tattooing with a blue logwood die or the actual cautery. The figures are as follows:—

Five Years, 1919–23.

1. Colloid and adenomatous goitre	198
2. Malignant disease	9
3. Exophthalmic goitre*	4
4. Myxœdema	2†
5. Cretinism	3
6. Operations upon the thyroid gland ..	78

* One of these cases of exophthalmic goitre should not strictly be included, for the exophthalmic symptoms only developed as a result of a metastatic growth of cancer of the breast in a normal thyroid gland.

† One post-operative.

These figures refer almost entirely to the fellaheen, the farmers or field labourers of Egypt, and to the manual workers of the urban populations. The fellaheen comprise 80 per cent. of the total population, the other 20 per cent. being comprised of the cosmopolitan inhabitants of the towns who have some admixture of the blood of the Southern European and Levantine races. But it is interesting to note that among Egyptians of wealth and of leisure who, from considerations of taste or of employment, live in the larger cities and towns and have adopted European habits and diet, the diseases and disorders of secretion of the thyroid gland are found much more frequently. Among the ladies of leisured Egyptian families exophthalmic goitre is becoming more common and cretinism is appearing among their children.

It is difficult to find a cause for this essential difference from European and American experience. The universal infection of the rural population with bilharziasis, ankylostomiasis, ascaris, &c., cannot be held responsible for this discrepancy, although statistics are now available to the effect that the picked men of the population who enter the army or the police are infected to the extent of 85 per cent.

Thyroid Enlargement in Ancient Egypt.

The history of enlargement of the thyroid gland can be read in the reliefs, statuary, and wall paintings of Predynastic, Dynastic, and Ptolemaic Egypt from 2000 years B.C. Representations of enlargement of the thyroid can be seen in all the ages, and dwarfism is constantly depicted. But none of these are cretins; they are all typical achondroplasias. The patron saint of the household and domestic affairs in Dynastic Egypt, the god Bes, is an example of achrondroplasia. The larger households of Dynastic Egypt frequently appear to have contained these dwarfs, and as they appear on occasions of religious festivals they seem to have had some ceremonial significance.[1]

Modern Incidence of Goitre in Egypt.

The age incidence in Egypt to-day is usually in women of 35 years of age. There is frequently a history of commencement in earlier years as an apparent development from the thyroid enlargements of puberty. Sex incidence of goitre is in proportion of 1 man to every 18 women. No conclusions can be drawn from the incidence in married and unmarried women, for nearly all adult Egyptian women are married young and have borne children. In this respect the full physiological life is led. There is also a definite family history of goitre in about 10 per cent. of those cases, in spite of a reticence and reserve about medical matters that is difficult to overcome.

The incidence of race has some bearing on the development of goitre. We find no cases among the Bedouin Arabs of the desert; but this may be due to their water-supply being from desert wells and not from the Nile, and to the fact that their water is comparatively clean as compared with the gross pollution of the pools, wells, and canals in the villages of the fellaheen. Copts, the native Christians, Jews, and the Syeds or descendants of the Prophet, all of whom represent minorities in the population and are more inbred than Moslem Egyptians, show a comparatively greater incidence of this disease. In the above respects our experience in Egypt is more or less that of Walton[2] and McCarrison.[3]

Possible Causes of Goitre in Egypt.

The geographical situation of Egypt, a narrow strip of alluvial soil on either side of the Nile, is of importance in the consideration of the causes of goitre. There is only one water-supply in Egypt proper, and that is the Nile. The sources of this river are the limestone mountains of Abyssinia for the Blue Nile, and the marshes of Equatorial Africa for the White Nile.

None of the waters of the Egyptian Nile is of Egyptian origin; it has all travelled 1000 miles before it reaches the Delta. We are informed that there is no goitre in Abyssinia, and we have seen none in the Sudan. There is limestone formation in the hills of the Northern deserts, but there is insufficient rainfall in Egypt to wash these salts into the Nile to any great extent. The villages on the banks of the Nile drink the water of the river; but the great majority of the rural peoples depend upon wells and irrigation channels, which are incredibly polluted. The villages along the Nile bank do not develop goitre as a rule; the enlargements of the thyroid occur almost entirely in villages remote from the river. Town-dwellers, who have an excellently clean water-supply as far as the big cities are concerned, show also a diminished incidence of colloid goitre. The iodine content of Nile water is slightly higher than that of the Metropolitan water-supply of London. The salt that is used for cooking and for eating, obtained by evaporation from the Mediterranean Sea or from the salt deposits from brine lakes, also contains a higher iodine content than the common table salts of Europe. Oral sepsis, as a contributing cause of goitre, is quite possible in Egypt. The teeth of young Egypt are naturally clean; but adult Egyptian teeth of the labouring classes, though free from caries, as a rule, are commonly filthy from a gross collection of tartar and food debris at the alveolar margin. There

[1] Armand Ruffer: The Palæopathology of Egypt.
[2] Walton, A. J.: Brit. Med. Jour., 1923, i., 1045.
[3] McCarrison, R.: Ibid., 1922, i., 178 and 636.

is no system of tooth-brushing, even with a twig, among the labouring classes. It may be more than a coincidence that goitre appears at the age when teeth become septic and gums swollen and inflamed.

The pathology of the goitres of Egypt exhibits no essential difference either in gross naked-eye appearance or in histological structure from that described in Western Europe. We can recognise all the histological differences described by Plummer.[4]

The diet of the rural population can hardly be held responsible for the incidence of colloid goitre or adenomata, though it may quite easily influence the non-development of disorders of secretion of the thyroid gland. It is almost entirely vegetarian. Meat is usually eaten once only in the week; and goat or mutton is the meat of choice. Swine flesh, as in all Moslem countries, is forbidden. So is alcohol in any of its forms, though, in the cosmopolitan towns, there is now a certain laxity in this respect. Cheese, milk, eggs, beans, spinach, and butter or oil form a large proportion of the daily diet. Onions are a constant feature of everyday food; so also, but to a lesser extent, is garlic. Fruits, such as dates, fresh figs, apricots, and water melons, are eaten in the summer months. There is no method of preserving meat by canning or smoking, or salting or drying in the sun. Nor is any chemical means employed to this end. Tinned or frozen or chilled meat is never eaten except in the towns.

The conclusions to which we have arrived in regard to the incidence of colloid goitre in Egypt are that it is almost entirely due to the polluted water-supply of the non-riparian villages. We suggest that one reason for the comparative non-development in men is possibly due to the fact that they depend less on the polluted village well and stored water than the women, for men in their field work drink from comparatively clean wells and irrigation channels. We do not feel that the universal parasitic diseases of Egypt, bilharziasis, ankylostomiasis, and ascaris, affecting as they do the men far more than the women, have any influence upon the development of diseases of the thyroid gland. Kocher and McCarrison have drawn attention to the influence of infected water-supplies.[5,6]

Explanation of Development of Hyperthyroidism and Cretinism in Egyptian Towns.

But we are of opinion that there are many factors which may explain the absence of disorder of secretion of the thyroid; they may also supply an explanation for the rapid development of exophthalmic goitre and of cretinism in the first generation of Egyptians who migrate to the cities of Egypt.

These factors are:—

1. The diet of the fellaheen, which is almost entirely vegetarian and of a high vitamin content. In the cosmopolitan cities, however, the adoption to some extent of European food and cooking has brought with it a liability to European diseases. Thus gastric ulcer, duodenal ulcer, gall-stones, appendicitis, and intestinal cancer are found almost entirely in the Egyptian urban dweller.[7]

2. The extreme rarity of nervous diseases, either functional or acquired, among the agricultural population of Egypt. The incidence of these disorders, however, is becoming more common now among the town-dwelling intelligentsia.

3. The complete absence of intestinal stasis or of any of the subjective nervous phenomena associated with this condition among the fellaheen. Evidences of this condition with hypochondriasis and valetudinarianism can now be observed in the urban districts.

4. The essential difference in the psychology of the Orient from that of England or America. There are here no suppressed emotions or complexes; we believe that the free liberation of all the great emotions is of much importance in the consideration of Graves's disease and its comparative absence in Egypt.

5. The absence of strain and stress over financial affairs. There is great poverty; but there is no great uncertainty as to crops in Egypt. The price of cotton, parasitic diseases of the crops, and the risk of cattle poisoning cause some anxiety. But the savings of the fellaheen are invested in land or cattle, and not in such fluctuating speculations as stocks or shares or cotton futures. He may worry about the price he gets for his cotton; but the fellah never sells cotton that he does not possess. The Nile flood saves him from all anxiety in regard to seasons; and his buffalo is immune to cattle plague and to tubercle. The fellah is a fatalist; but there are nowadays many anxiety neuroses among the urban population that has not yet adapted itself to the rapid development of modern civilisation.

6. The simple uncomplicated lives led by the country people. The industrial revolution of the past century and the introduction of machinery have not altered their lives to any great extent. Yet owing to the exigencies of employment, or Government service, or education they may at one step pass from twelfth century village life to the bustle and noise of twentieth century Cairo, from the village street where the donkey is the swiftest mode of progression to the taxi-cab. We believe that it is these aspects of civilisation that are responsible for the development of hyperthyroidism in the towns.

7. The high infant mortality, 40–50 per cent., in the first year of life. Cretins in all probability would not survive.

8. The endocrine balance of the Egyptians. All disorders of internal secretion, with the exception of true diabetes, are rare. As in all the pigmented races that we have examined at autopsy the suprarenal capsule is noticeably much larger than in Western Europeans. The average weight of the Egyptian suprarenal capsule, from a series of 200 autopsies performed by the late Prof. Ferguson, when all fat has been dissected off, is 5 g.; of the European 3·5 g. We venture to bring this suggestion forward merely as a hypothesis, the justification for which rests in the fact that it indicates a line for future investigation.

[4] Plummer: American Journal of Medical Science, 1913, cxlvi., 790.
[5] Kocher: Proceedings of Royal Society of Medicine, March, 1912.
[6] McCarrison: Vide supra.
[7] Dolbey, R. V., and Mooro, A. W.: The Incidence of Cancer in Egypt, THE LANCET, 1924, i., 587.

NOTES ON SUPRARENAL AND PANCREATIC GRAFTING.

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THE notes of four cases dealing with the above subject, here recorded, were communicated to the International Society of Surgery at the London meeting last year. The first two cases represent attempts to cure Addison's disease by homoplastic grafting.

Seeing that the use of extracts of the suprarenal glands has failed to give relief in this disease, the only rational remedy seemed to be that of grafting. As heteroplastic methods have been tried and failed, the homoplastic method appeared well worthy of trial. The difficulty of such methods, of course, is in obtaining a suitable donor.

Suprarenal Grafting.

CASE 1.—The patient, a man aged 40 years, and a miner by occupation. The illness commenced in September, 1915, with occasional vomiting, accompanied by gradual weakness and shortness of breath, so that in a few months he became unable to walk more than a few yards. At the same time his colour changed, and he became obviously pigmented.

He was admitted to hospital, where he was diagnosed as a case of Addison's disease, and was later discharged without any relief being effected. He came under my care in February, 1916, with marked asthenia, a general bronzing, a systolic blood pressure of 110 mm. Hg, and a blood picture closely resembling that of pernicious anæmia, the red count numbering 2,200,000 cells. The nature of the disease was explained to him and the proposed treatment, which he agreed to accept. He was admitted to hospital, and on March 2nd, 1916, a suitable donor was found. This was a healthy young man who had sustained a fractured spine in a colliery accident, and was almost moribund on admission. He died during the morning, and was brought immediately to the anteroom of the theatre, where, with due precautions, the suprarenal glands were removed. The recipient was already under an anæsthetic (nitrous oxide and oxygen), and the glands, within a few minutes of their removal, after being split into two halves along the natural line of cleavage in the centre of the medulla, were inserted subcutaneously, one portion beneath the breast, the remaining portion in each supraclavicular fossa. The wounds healed by first intention, and he was discharged from hospital 10 days after the operation, and was well enough to take a train journey and after this walk five miles to his own house.

Further History.—June, 1916, much improved; June, 1917, has worked one year at light work; June, 1918, has worked one year full work in the mine. By six months after the operation the pigmentation had entirely disappeared. In July, 1918, the symptoms returned. He began to become weak and the pigmentation again appeared.

The second operation was performed in 1919, when only one-half of a gland obtained by the same method was inserted into the supraclavicular fossa. A careful examination of this site was made, but no trace of the previous graft was found. In 1920 he remained in much the same condition; in 1921 he improved, and has been earning his livelihood for the past three years as a hawker.

At the present time he is slightly pigmented, the blood picture is normal, the blood pressure 130–175 mm. Hg.

Remarks.—Although this patient cannot be said to be in the best of health, he has been seen by most of my colleagues, who have agreed as to the diagnosis. The case was not published before as it was decided to do another in order further to test the results.

CASE 2.—A woman aged 25, with typical Addison's disease; blood pressure 60 mm. Hg. She was operated on on July 7th, 1922, the grafts being supplied by a male donor, whose blood tests revealed him to belong to the group of universal donors. The operation was carried out satisfactorily and the wound healed, the blood pressure for the next few days rising to 80 mm. Hg. This improvement was not maintained, the grafts appeared to absorb in about ten days, and the patient died some weeks later.

Pancreatic Grafting.

The two other cases represent attempts to relieve diabetes by pancreatic grafting. The experimental work and pathological findings pointed to the pancreas being at fault in a considerable number of cases at least, while experimental work showed that pancreatic grafts could live in a new environment. As the injection of ordinary pancreatic extract failed in its purpose, it was thought worth while to attempt homoplastic grafting in two very severe cases that were likely to end fatally in any case.

The first patient, a man of 37, the second, a man of 32, both with grave and intractable diabetes, were grafted in July, 1916, from a male donor, the grafts being obtained immediately after death by accident. The gland was divided into thin slices, four portions being placed in the subcutaneous tissue of the abdominal wall. In one case two grafts became infected and discharged out, and in the other two degenerated, although the wound healed over them. It had subsequently to be opened to allow of the discharge of the graft and surrounding liquefied tissue. In one of these cases temporary diminution of the sugar excretion was noted, but in both cases the graft failed to relieve the diabetes. One case terminated fatally three months afterwards, the other after three years.

Not much can be said about the principles of grafting, but it seems that until we are able to understand them (and I feel we do not understand them at present, especially the chemical factors), then we must continue to fail in such operations, although they may appear the most rational treatment for the diseases for which they were attempted.

Clinical and Laboratory Notes.

EUNUCHOIDISM IN SISTERS.

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IN his book on endocrine diseases Falta says[1]: "Eunuchoids we term, according to Tandler and Grosz, individuals who, without being castrated, entirely simulate in their clinical manifestations the true eunuch type, or at least are extraordinarily similar to it. They are either tall, or if complications are absent, at least not stunted in growth; they show the typical fat-distribution of eunuchs, and eventually pronounced obesity; the epiphysial junctures persist abnormally long, the skeletal dimensions are characterised by an especial length of the extremities, and furthermore, the individuals show a definite psychical habitus. Finally, there is found a more or less pronounced disturbance of development of the genitalia with faulty development of the secondary sexual characteristics."

F. M. and A. M., sisters, aged 24 and 22 respectively, were sent to the Elizabeth Garrett Anderson Hospital for primary amenorrhœa. Both sisters had walked at one year; at school they were normal in height, but had grown rapidly between 14–18, since when neither had grown much. There are two others in the family, the youngest, a boy aged 17, is tall; and a sister aged 19, who is normal in height and menstruates regularly. The father is tall; the mother, of normal height, has a normal menstrual history.

The eldest, F. M., height 5 ft. 10¾ in., weight 9st. 1½ lb., is very intelligent, has a feminine voice and appearance, a boyish manner, and rather a sallow complexion. There is no development of breasts, axillary or pubic hair. The external genitalia are of the infantile female type. No hymen is present. There is a wide opening into the vagina, which is a pouch about ¾ inch in height, the uterus and ovaries are not palpable. The measurement from the umbilicus to the ground is 70 per cent. of the total height instead of the usual 60 per cent., the legs being abnormally long in proportion to the height. The upper limbs are also abnormally long. The left field of vision is normal, the right shows a slight contraction (10°) on the temporal side, both fundi are normal. The urine is normal in quantity and constituents. The sugar tolerance is normal. Systolic blood pressure is 118 mm. Hg. Wassermann reaction is negative. X ray examination shows the pituitary fossa to be normal in size and outline, the epiphyses of the long bones to be still separate from the shaft, the hands to be of the male, and the pelvis of the female type.

A. M., height 6 ft. 1½ in., weight 11 st. 1¾ lb., is intelligent, has a feminine voice, appearance and manner, and a fair skin. There is some development of the breasts; palpation suggests this is fat and not glandular tissue. There is no axillary hair, and only a few pubic hairs are present. There is an abnormal deposit of fat in the abdominal wall. The external genitalia are of the infantile female type; a hymen is present; the opening in the vagina is wide, the latter being a cul-de-sac about 1 inch in height, at the top of which is a small nodule about the size of a pea, which appears to have no opening. The uterus and ovaries are not palpable. The arms and legs are again long in proportion to the height, the measurement from the umbilicus to the ground being 66 per cent. of the total height. The fields of vision and fundi are normal. The Wassermann reaction is negative. Systolic blood pressure is 120 mm. Hg. The urine is normal. The sugar tolerance test (made by Miss E. M. Martland, M.B., B.S.) gave an abnormal result. Blood-sugar per cent. (fasting), 0·103; after half an hour, 0·215; after one hour, 0·204; after one and a half hours, 0·199; after two hours, 0·125. No glycosuria was detected during the test.

X ray examination showed the pituitary fossa to be normal in size and outline, the bones of the hands and pelvis to be of the female type, and the epiphyses of the long bones to be still separate from the shaft.

It is difficult to be certain of the psychical habitus of these girls; both say the male sex has little attraction for them. The younger has all the physical characteristics of a eunuchoid as given in the above definition: the elder has all except the

[1] Transl. Meyers, Philadelphia, 1915.

abnormal fat deposit. I consider that the data in both cases justify their classification as eunuchoids. Eunuchoidism in females is extremely rare, and I find no record of its occurrence in sisters.

My thanks are due to the various members of the staff of the hospital who helped in the investigations, and to Mr. Ulysses Williams who kindly took the X ray photographs.

NOTE ON AN UNUSUAL CAUSE OF DEATH IN SUBACUTE INFECTIVE ENDOCARDITIS.

BY M. WEINBREN, B.SC. (SOUTH AFRICA), M.R.C.S. ENG.,

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AND

THE LATE T. H. JAMIESON, M.D., M.R.C.P. EDIN.,

LATE VISITING PHYSICIAN TO THE HOSPITAL.

IN view of the unusual termination the following case is of interest.

W. L., aged 35, enlisted in 1908, and was discharged in January, 1919. His invaliding disability was V.D.H. with aortic insufficiency, the date of origin being uncertain, and he gave a history of malaria contracted in East Africa in 1914.

Condition on Admission.—When admitted into Orpington on May 5th, 1923, he was anæmic and his general condition was poor. The apex beat was in the fifth space, just beyond the nipple line, and the right border of the heart at the right edge of the sternum. A loud systolic bruit could be heard all over the chest, loudest in the mitral area, and a faint diastolic murmur could be heard in the mitral area and along the left border of the sternum. The liver was enlarged to about one inch below the costal margin and the spleen was palpable on inspiration. There was no œdema of the legs and no signs of fluid in the abdomen. During the period in hospital he ran an intermittent temperature between 100° and 97·5° F., and his pulse varied between 104 and 84. A Wassermann test proved negative. Blood cultures also proved negative. The urine showed a good trace of albumin, a few blood casts, and a fair number of pus cells.

On June 27th he complained of a sudden stab of pain in the left chest, radiating from the left costal margin to the left clavicle, and recurring with every inspiratory movement. There was considerable tenderness and rigidity below the left costal margin, and a to-and-fro rub was detected over the splenic area. His pulse was 98 and temperature 97·8° F. Splenic infarct was diagnosed. The patient steadily improved, the pain, rigidity, and tenderness passing off at the end of a week. The spleen was then found to be more easily palpable than on admission.

On July 16th, although feeling much brighter during the day, he complained of a sudden attack of giddiness about 7 P.M. and died within 15 minutes. Autopsy showed the heart to be enlarged. There was no pericarditis and no naked-eye changes in the muscle wall. There were few firm vegetations on the aortic valve and there were vegetations on the mitral valve, which was greatly thickened and had an arc ulcerated away from the anterior flap. The aorta was healthy. On opening the abdomen it was found that the whole peritoneal cavity was filled with blood clot, and post-peritoneal blood staining was seen on the left side of the vertebral column adjacent to the spleen and left kidney. An attempt was made to trace the source of the hæmorrhage. No aneurysm was found and no ulceration or any change of note in the stomach or intestines. The kidneys were enlarged, pale, fatty, and had a flea-bitten appearance. On removing the spleen (which was enlarged, weighing 19½ oz.) a transverse yellow infarct, which on section was seen to be lined with a dark red layer, showing that it was of recent origin, was found at the upper pole. Quite separate from the infarct, on the diaphragmatic surface of the spleen, was a discoloured area about three inches in largest diameter. The capsule of the spleen, both serous and fibro-elastic coats, was detached from the pulp, and it was evidently from this area that the hæmorrhage had taken place, the blood having oozed into the retro-peritoneal tissue and not through the hilum or lieno-renal ligament. On section, a large cavity was seen in the centre of the spleen and the tissue round it, microscopically, was found to be quite necrotic.

The cause of death was evidently a blood-vessel giving way in the necrotic portion of the spleen, which was probably a soft infarct. The capsule of the spleen tearing with the increased pressure allowed the patient to bleed to death. We have been unable to trace any record of a similar termination to a case of subacute infective endocarditis.

The Director-General of the Medical Services of the Ministry of Pensions kindly gave us permission to publish the case.

MOBILE ASCENDING AND TRANSVERSE COLON.

BY T. A. B. HARRIS, M.B., B.S. MELB.

THE following case is of interest, both on account of the infrequency of the condition and of the trouble it may give the surgeon.

E. B., female, aged 16, was admitted to Ipswich Hospital, Queensland, on June 13th, 1923. There was a history of three separate attacks of sudden pain in the lower abdomen, settling down into the right iliac fossa, with constipation, fever, dry tongue, and rapid pulse. On admission she was definitely tender over McBurney's point. A diagnosis of chronic appendicitis was made, and an appendicectomy performed on June 11th. The cæcum, ascending and transverse colons were located on the left side lying parallel to the descending colon, and entirely covered with small bowel. The appendix showed signs of recent inflammation and was removed. The cæcum, ascending colon, and half the transverse colon were entirely free and had no attachment and no mesentery. The bowel was pale in colour, and the great omentum was very short (2 inches). No attempt was made to anchor the floating bowel, as the patient was beginning to feel the effect of the excessive manipulation necessary to locate the appendix. She made an uninterrupted recovery.

Comments.

In early fœtal life the colon lies entirely to the left side of the abdomen attached by a mesentery to the posterior abdominal wall. With the elongation and growth of the small intestine that portion which eventually forms the cæcum, ascending and transverse colon swings to the right side, and at the fourth month of extra-uterine life the cæcum is found immediately below the liver (F. Treves). From this time the large intestine grows in length and size, and takes up the position found in the normal adult. G. E. Waugh [1] describes cases of irregularities of the colon under four main heads: (1) Undescended cæcum. (2) Mobile ascending colon and cæcum in which it has descended, but has retained its primitive mesentery. (3) Mobile ascending colon and cæcum in which it has descended and has been fixed, but has acquired a false mesentery. (4) Two cases in which the whole of the colon lay in the left iliac fossa, having made no attempt at rotation from its primitive position to the right side of the body. In one case—a girl, aged 11 years—chronic appendicitis had been diagnosed; in the other—a woman, aged 22 years—treatment for gastric ulcer had been given for nearly two years before operation. At operation no disease of the appendix or stomach was present in either case. Radiograms of barium meals, taken previously to the operations, had failed signally to indicate the presence of the abnormality in both cases—in fact, the right colon appeared to be in a more or less normal position in the right iliac fossa and pelvis. A primitive dorsal mesentery was present along the whole length of the alimentary tract from duodenum to rectum.

In this case there seem to be two alternative explanations. It may be that the colon had failed to rotate to the right side, while developing normally as regards shape and size, and together with this had lost its primitive mesentery. The other explanation may be that it has developed in a normal manner, but has failed to become anchored to the posterior abdominal wall and has lost its primitive mesentery, which is the more probable explanation. At opera-

[1] Waugh, G. E.: Brit. Jour. Surgery, January, 1920; Brit. Med. Jour., November, 1922.

tion the condition of the patient did not warrant an investigation of the blood-supply of the floating bowel. Its appearance was pale and led one to believe that the blood-supply was not as fine as that of the rest of the bowel. Since operation, however, the patient has remained well and the blood-supply, however curtailed, seems to be sufficient.

The fact that with the cæcum floating the point of maximum tenderness was over McBurney's point is an example of pain referred to the ninth and tenth thoracic nerves.

Reviews and Notices of Books.

OBSTETRICS.

A Text-book for the Use of Students and Practitioners. Fifth enlarged and revised edition. By J. WHITRIDGE WILLIAMS, Professor of Obstetrics, Johns Hopkins University. London and New York: D. Appleton and Company. 1923. Pp. 1076. 40*s*.

FOR 20 years this excellent text-book has been before the profession, and each succeeding edition has served but to increase its value and the esteem in which it is held. As a monument of careful observation and record it has few equals, and its importance is enhanced by the clear judgment and care which the author exercises throughout.

To the practising obstetrician the work is essential, and in the fifth edition the practitioner will find a useful and conservative guide to the modern treatment of all obstetric difficulties with which he may be confronted. All recent writings of importance have received consideration, and the march of progress is duly emphasised. At the same time Prof. Whitridge Williams issues a strong and, we think, justified plea in many directions for conservatism. He draws attention to the fact that recent American statistics have shown a definite rise in the puerperal death-rate in that country, and that child-birth was actually more dangerous in America in 1921 than in 1916. Further, this death-rate is greater in urban than in rural communities. He attributes this to the fact that many practitioners have been led astray by the teaching of those who regard labour as a pathological rather than a physiological process, and he thinks that unjustifiable interference is frequently undertaken by those who do not fully appreciate the risk involved. It is interesting to note that an inquiry by a committee of the Massachusetts State Medical Society into the puerperal death-rate showed during the year 1921 that after puerperal infection Cæsarean section ranked in America as the most frequent cause of death from child-birth. It is but natural, therefore, that the author has some strong remarks to make not only against the abuse of this operation, but against obstetric meddling in general. In fact, the keynote of conservatism is noticeable throughout the volume. We welcome this expression of moderation, coming as it does at an epoch when excess of operative zeal is tending in some quarters to displace the true art of obstetrics, to the detriment, we fear, of maternal well-being.

The book follows the general arrangement of its predecessors, but each chapter has been thoroughly overhauled and brought up to date. There is, for example, a full and instructive criticism of Potter's monograph on the "Place of Version in Obstetrics," in which the author adduces very cogent arguments against the general acceptance of Potter's teaching. Recent methods of diagnosis such as the use of X rays in the investigation of pelvic contraction and fœtal positions are discussed, and full references given. In fact, the unusually complete bibliography appended to each chapter, indeed almost to each paragraph, is a feature of the book which makes it invaluable as a work of reference. The details of obstetric management which the author advocates are, generally speaking, those in use in this country. A few variations occur. For example, Prof. Williams appears to favour the use of de Ribes's bag in preference to bipolar version in the treatment of placenta prævia, chiefly, as he says, in the interest of the child. Again, when discussing post-partum hæmorrhage no mention is made of bimanual compression of the uterus, a method which is always available and usually effective. The book has been enriched by several new illustrations well reproduced.

NOUVEAU TRAITÉ DE MÉDECINE.

Fascicule XI.: Pathologie de l'appareil respiratoire (nez, larynx, trachée, bronches, poumons). By FERNAND BEZANÇON et S. I. DE JONG, H. BOURGEOIS, HUTINEL et PAISSEAU, P. HARVIER, L. RIBADEAU-DUMAS. Paris: Masson et Cie. Pp. 636. Fr.45.

WE have in previous reviews had occasion to call attention to the general excellence of the system of medicine, of which the present is the eleventh volume. This high standard is here maintained, the logical arrangement and clear description of physical signs, morbid anatomy, and general pathology being in the best tradition of French medical writers. The relegation of pneumonia to the volume dealing with infections leaves a gap in this volume, but the field here covered is enormous. Many English readers will cavil at the description of asthma by Prof. F. Bezançon and S. I. de Jong, who, whilst making some reference to protein-sensibility, continue to deal with the disease mainly from the respiratory point of view. Even hay fever is said to be a disease, occurring chiefly in America, and the modern conception of asthma as a toxic idiopathy is almost ignored.

We commend the volume as a corrective to insularity as well as on account of its completeness and admirable style.

PHYSICAL DIAGNOSIS.

Eighth edition. By RICHARD C. CABOT, M.D., Professor of Medicine in Harvard University; formerly Chief of the West Medical Service at the Massachusetts General Hospital. London: Baillière, Tindall and Cox. With 6 plates and 279 illustrations. Pp. 536. 25*s*.

THE new edition of this well-known book maintains the high standard of its predecessors, and should tend to make it still more popular. Every medical student should possess a copy. The minutiæ of examination are clearly described, and the proportion of space given to such fundamentals as the technique of percussion and auscultation is adequate. A notable change from former editions occurs in Chapter XVIII., where Dr. Cabot has completely revised his views on emphysema. "Till 1921," he writes, "I thought I could recognise emphysema. The following facts have disillusioned me. In 12 cases diagnosed as emphysema at the Massachusetts General Hospital, only three showed any emphysema post mortem. On the other hand, of the 153 cases demonstrated post mortem, only seven were recognised in life." "I know to-day nothing about the physical signs of emphysema," he says later, and proceeds to write an illuminating chapter on the "barrel chest" distinguished alike by its clarity of description and absence of dogmatism. The plates and illustrations are admirably reproduced.

PRACTICAL ELECTROTHERAPEUTICS AND DIATHERMY.

By G. BETTON MASSEY, M.D., Fellow and former President of the American Electrotherapeutic Association. London: J. and A. Churchill. 1924. Pp. 401. 21*s*.

IN the first nine chapters of this book the author deals with the various currents used in medical electricity. He describes their nature, the methods of producing them, and their action on the body. In the remaining chapters (X. to XIX.) electrical treatment of various diseases and symptoms is

described. Dr. Massey devotes a special chapter, the longest in the book, to the subject of the treatment of malignant growths by zinc ions, a method to which he has devoted many years of study. Full details of technique used by him are included, the results being illustrated by photographs of the patients before and after treatment. The cases figured have been kept under observation for not less than two years, and, judging by the illustrations and descriptions, the results appear to be excellent. Currents of 2000 or even 3000 milliampères were used in some cases, and by confining them to the growth and its immediate vicinity the dangers which would attend the uncontrolled use of currents of this kind and strength are avoided. Currents of this strength produce enough heat to coagulate the tissue proteins. The destruction of the growth is caused, therefore, by heat as well as electro-chemical cauterisation. In another chapter the author describes a method of treating tuberculous glands and cystic goitre by zinc ions. The chapter entitled Electricity in Industrial and Reconstructive Surgery deals almost entirely with the testing of electrical reactions. The method described is that in which the faradic and galvanic currents are used, but there is a short account, quoted from another writer, of the condenser method. Dr. Massey also quotes an account, by another author, of the "progressive galvanic test." This is really a form of treatment in which denervated muscles are made to contract by a selective stimulus which does not cause simultaneous contraction of muscles with intact nerve-supply. In this account a wrong impression is given of the meaning of the term "chronaxic."

This book will be read with interest by those who are experienced in medical electricity, especially the section on the treatment of malignant growths. It is less suitable for the beginner as the descriptions given in certain parts, more particularly those dealing with physics and physiology, are insufficiently clear and not always free from mistakes. Thus in the account of the effects of the direct current on the tissues the beginner might confuse cataphoresis with migration of ions. Such expressions and statements as the "soapy ions of sodium and hydrogen," the "cations of water" (p. 41), Wallerian degeneration in "nerve endings or muscle," "the neuraxon may be said to curdle" (p. 167), "the negative polar surface receives a similar blast of nitrogen" (p. 133) are loose and unscientific. On p. 41 "catophoresis" and on p. 323 "sinusodial" are misprints. The book is well illustrated.

DIABETES.

A Diabetic Manual for the Mutual Use of Doctor and Patient. Third edition. By ELLIOTT P. JOSLIN, M.D., Clinical Professor of Medicine, Harvard Medical School, Boston, U.S.A. Philadelphia and New York: Lea and Febiger. 1924. Pp. 211. $2.

"To help make the home safe for the diabetic is the object of the book."

Prof. Joslin has set out plainly all that he thinks a patient should know about the cause and treatment of the disease. As his book occupies 203 pages (including the tables) it is obvious that he thinks that the patient should know a great deal. It is equally certain that if a doctor recommends a book to a patient he should learn its contents most carefully or he will not retain the patient's confidence. The volume should fulfil its purpose as the details are most carefully thought out. Very little is said about diabetic foods; Joslin says that those of his patients who have done best have either abstained altogether from their use or have only used a few varieties. Instructions as to the administration of insulin are clear and good; the things which the patient should know in order to save the doctor's time are very important. The food tables are very full, but are not arranged in the most convenient way as they are only given in percentages instead of in so much per ounce The last-named practice is a great convenience for patients who only use the English weights.

Diabetes: its Treatment by Insulin and Diet. A Handbook for the Patient. By ORLANDO H. PETTY, B.S., A.M., M.D., F.A.C.P., Professor of Diseases of Metabolism, Graduate School of Medicine, University of Pennsylvania. Philadelphia: F. A. Davis Company. 1924. Pp. 111. $1.50.

THIS little manual covers somewhat the same ground as Prof. Joslin's, but it is written in a less elaborate form and is suitable for patients with less education. Diabetes, above all other diseases, requires the intelligent coöperation of the patient, and books must be available for all grades. Here the greatest stress is laid on the minute details of managing the diet, weighing, and injecting insulin. The book will be of assistance as a guide to patients.

NOUVEAU TRAITÉ DE CHIRURGIE.

Troisième édition. Fascicule XXIX.: Hernies. Par MAURICE PATEL, Professeur Agrégé à la Faculté de Médecine de Lyon. Paris: J. B. Baillière et Fils. 1924. Pp. 540. Fr.45.

A VOLUME on a subject with which we are familiar, when it arrives from another country teaches us more than facts. We enter a new atmosphere where values differ from our own, and realise that even such a cosmopolitan subject as surgery may have a strong national bias, while we find that its methods and even its history may look quite different when seen through other eyes. Prof. Patel's book is not imposing in form and the absence of an effective index makes reference difficult. But none the less, it contains a large amount of useful information clearly arranged, and evidently represents the general teaching of the French school of surgery at the present day. The views expressed are eminently sound and practical, the pathology is clearly described, and certain suggestions made, for example, as to the origin of umbilical hernias, are of considerable interest.

It is discouraging to find almost no mention of English surgery; filigrees and darning are at least worthy of mention as resources in difficult cases. But a more painful blow is the description of the "English" truss, a contrivance which has disappeared even from instrument makers' catalogues. If, indeed, England is responsible for its invention we must plead it was more than a century ago. Workmen's compensation appears to have its difficulties in France, and there is an excellent discussion on the legal aspects of hernias. It is generally agreed that in not one case in a hundred is a hernia the real result of an accident, but the Cour de Cassation proved equal even to this difficulty and its finding on the subject is delightful. "Mais en admettant que le travail de Th. n'ait pas été la cause de la hernie, il en avait été du moins l'occasion." Apparently, if opportunity makes the thief, it also makes the hernia.

A PÆDIATRIC HANDBOOK.

Handbuch der Kinderheilkunde. Edited by Prof. M. VON PFAUNDLER (Munich) and Prof. A. SCHLOSSMANN (Düsseldorf). In four volumes. Leipzig: F. C. W. Vogel. 1924. Vols. II. and III., pp. 700 each.

THE second and third volumes of this monumental handbook are now published, and may well serve as a valuable mine of information to physicians specially interested in children's diseases in all lands. Opinions will naturally differ as to certain conclusions reached by the writers, but the general editorship is so good and the work is so typical of what is best in German industry that no one can fail to obtain great help by reference to such a work. The second volume deals with the infectious diseases, and is remarkable not only for the articles by Prof. B. Schick (Vienna),

Prof. J. Bauer (Hamburg), and Prof. M. Stoob (Berne), but also for the coloured photographs of the rashes and the lesions of the exanthemata, which are models of accuracy. The third volume deals with diseases of the digestive, respiratory, and circulatory systems, and achieves a level as high as that of its predecessor. If it is not invidious to select certain articles for special mention, attention might be directed to those by Prof. E. Feer (Zurich) on congenital pyloric stenosis, and by Prof. St. Engel (Dortmund) on diseases of the lungs. Too big for the needs of general practice, this handbook should certainly be on the shelves of all medical libraries.

JOHANNES DE KETHAM.

The Fasciculus Medicinæ of Johannes de Ketham, Alemanus. Facsimile of the first (Venetian) edition of 1491. With Introduction by KARL SUDHOFF. Translated and adapted by CHARLES SINGER. London: Humphrey Milford, Oxford University Press; Milan: R. Lier and Co. 1924. Pp. 56 and 13 plates. 46*s*.

THIS sumptuous production is of interest as the first printed general manual of professional information for medical men; it includes not only treatises on medicine, but also upon midwifery and surgery. Prof. Sudhoff gives reasons for thinking that Ketham is really a variant of Kircheim, and Johannes de Ketham was, in fact, a Swabian, Johan von Kircheim, Professor at Vienna about 1460. He compiled the Fasciculus from various manuscripts and sets of rules for medical practice which were in vogue before his time. The book opens with an account of the urine and the various diagnoses to be made from an inspection thereof; there follows an elaborate section upon bleeding, and next come a section upon gynæcology, one on generation and midwifery and a surgical section. The final section is an attempt at a short dictionary of medicine.

As an appendix is given the interesting tract of Peter of Tussignano on the plague, with rules for avoiding infection and indications for treatment. This treatise is well worth reading. In one passage in a section upon various doubtful points, he discusses the question (in the ninth doubt) as to whether monks and prisoners do not die of the plague, although he adds, "sometimes they all die, and at other times not so." The answer is as follows: Those who live in a closely guarded community are not so much exposed to infection as those outside. But if one of the community should become infected the infection rapidly spreads. It must be noted that in the Black Death of 1348–49 the mortality among the regular clergy was exceedingly high.

All those interested in medical history owe a debt of gratitude to those who have made this most interesting treatise available at a comparatively moderate cost to modern readers.

QUANTITATIVE ORGANIC MICROANALYSIS.

By FRITZ PREGL, D.Sc., Ph.D., Professor of Medicinal Chemistry; Principal of the Medico-Chemical Institute of the University of Graz. Translated by ERNEST FYLEMAN, B.Sc., Ph.D., F.I.C. London: J. and A. Churchill. 1924. Pp. 190. 12*s*. 6*d*.

Dr. Pregl's work on micro-analysis is too well known to require introduction to anyone conversant with continental chemical literature. It will be remembered that he evolved the technique for the ultimate analysis of very small quantities of organic compounds. By his method carbon and hydrogen can be determined accurately in quantities weighing 7 to 13 milligrammes, whilst sulphur and halogens can be estimated in even smaller quantities. Up to the present detailed accounts of these techniques could only be obtained from German publications, such as Abderhalden's *Biochemischen Arbeitsmethoden* and Weil's *Methoden*. The present volume is therefore the only account of micro-analytical methods published in English. The descriptions are full of such minute details as to astonish any reader unaccustomed to German analytical methods, but these details are very necessary if the technique is to be carried out efficiently.

With the increasing importance of biochemistry, and particularly with that section dealing with chemotherapy, the need for micro-analysis has become urgent, and the volume will be welcomed. The translator deserves praise for his careful work.

THE CONQUEST OF CONSTIPATION.

By WILLIAM S. WALSH, M.D. London and Toronto: J. M. Dent and Sons, Ltd. Pp. 265. 5*s*.

THIS book contains a certain amount of scientific fact in a mass of popular description. For the medical reader it will have little interest, and for the lay reader we fear that it will tend to accentuate those psychic effects of constipation which may be so disastrous. The author writes fluently, and his book is well printed and of a useful size.

JOURNALS.

BIOCHEMICAL JOURNAL. Vol. XVIII., No. 384. 1924.—This issue commences with an obituary notice of the late Prof. Tigerstedt, in which his work is reviewed. The majority of the papers deal with the chemical side of the subject, but there are some of direct clinical interest.—In her paper entitled Calcium Content of the Blood During Pregnancy, Part II., Miss S. T. Widdows describes the extension of her work to pathological cases. In a previous paper the calcium content was found to vary with the stage of pregnancy. Thus, there is a drop in the calcium content after the eighth month. In abnormal cases, such as those of albuminuria, eclampsia, the fall occurs earlier, at about the fourth month of gestation.—K. Tallerman, in his communication on the Type of Sugar Excreted in the Urine of Normal Persons, describes experiments designed to throw light on the nature of the blood-sugar. He reviews very briefly the current views concerning α, β, and γ glucose, and refers to the work of Winter and Smith, who stated that sugar in normal blood was in the γ form. It will be remembered that they claimed that the sugar of diabetic blood was in the β form, and that insulin converted the β to the γ form. Tallerman calls attention to the criticisms of Hewitt on the drastic methods of heating the blood prior to polarimetric observation, and suggests that examination of the urinary sugar might clinch the matter. From a series of careful experiments Tallerman concludes that the sugar excreted by normal persons after an injection of phloridzin is in the α β form. Also that passed by diabetics wus not γ glucose. He therefore concludes that it is extremely unlikely that γ glucose is present in the blood or urine of normal persons.—H. W. Dudley describes the preparation of insulin from the pancreas of cod fish. The islets were dissected out on the trawlers and were preserved in aqueous solutions of picric acid. By means of an extraction process, described in the paper, large yields of insulin were obtained. Thus, even after the fish had been dead for 24 hours, a yield of 13·12 rabbit units was obtained. The author has worked out that the islet tissue of the cod fish contains about ten times as much insulin, weight for weight, as the human pancreas.—There are also papers on rickets and vitamins by E. M. Luce and R. Robinson and E. M. Soames.

BRITISH JOURNAL OF CHILDREN'S DISEASES. Vol. XXI. July–September.—Dr. Sydney A. Owen and Dr. A. Neave Kingsbury contribute a paper on the

Diagnosis of Congenital Heart Disease in the Newborn, including a Record of Cases of Fœtal Endocarditis and Mal-development. The writers remark that it is sometimes very difficult to differentiate between such widely different clinical states as (*a*) primary heart failure; (*b*) acute broncho-pneumonia without fever in a stage so early that heart failure seems improbable; (*c*) pulmonary atelectasis, where cyanosis and rapid breathing are the chief or only signs; (*d*) cerebral hæmorrhage, where cyanosis and rapid pulse and respiration predominate; (*e*) suprarenal hæmorrhage, where the same signs are present; (*f*) diaphragmatic hernia accompanied by cyanosis and periodic dyspnœa.—Dr. G. Kerr Cross makes a Report on Blood Transfusion Work Seen in the Hospital for Sick Children, Toronto, Canada. From Oct. 1st, 1922, to Sept. 30th, 1923, 394 simple transfusions and 122 exsanguination transfusions were carried out at this hospital. The indications for simple transfusion were (1) gross hæmorrhage, (2) anæmias of all kinds, (3) shock of all kinds, (4) as a preparation for operation in debilitated patients, (5) as a therapeutic measure in cases of marked debility. The results were excellent in anæmias, hæmorrhages, and debility, and of much greater service than intravenous injections of saline or gum acacia in shock. In post-operative conditions the method was a very valuable prophylactic against shock, considerably diminishing the mortality, especially in pyloric stenosis and intussusception. It also proved useful as a pre-operative measure. The indications for exsanguination transfusion were (1) septicæmias, such as erysipelas; (2) septicæmias suspected, but not proven; (3) intoxications, including the toxic stage of burns, acute intestinal intoxication of infants, and intoxication of human or unknown origin. Excellent results were obtained in erysipelas, and in toxæmia caused by burns exsanguination transfusion appeared to offer the only hope of recovery, while in acute intestinal toxæmia the mortality was reduced by half.—Dr. G. W. Ronaldson contributes a Note on "Spasmodic" Diphtheria, with two illustrative cases, showing that diphtheria may be complicated by spasmodic nervous symptoms, which are most likely to be found in persons with a nervous predisposition. These symptoms are rare, and it is doubtful if they ever occur in patients who have not suffered from diphtheritic angina. Further proof is needed before a diphtheritic origin can be assumed for such symptoms in subjects who have no characteristic symptoms of diphtheria.—Dr. Macdonald Critchley reports a case of Post-diphtheritic "Chorea," associated with the ordinary diphtheritic polyneuritis, and alludes to a similar case recorded by Globus.—Dr. J. M. Smellie describes three cases of Congenital Duodenal Occlusion. Two died within a few days of birth, which is the almost invariable rule, and the third survived for nearly three months. The site of the occlusion in one case was just below the opening of the common bile-duct, of which type there are about 23 recorded cases. In the second case the duodeno-jejunal flexure was the site, of which type about 11 examples have been observed. In the third case the occlusion occurred just above the opening of the common bile-duct, but there was also a complete interruption in the continuity of the gut, and the second part of the duodenum appeared to arise from the junction of the common bile-duct and pancreatic duct. No previous example of this variety seems to have been reported.—Dr. F. Parkes Weber writes on Developmental Telangiectatic Hæmorrhage and So-called "Telangiectasia"—Familial and Non-familial, which includes telangiectatic epistaxis, hæmoptysis, hæmaturia, hæmatemesis, and bleeding from the rectum.—Dr. Parkes Weber also contributes a paper entitled a Law Regarding the Distribution of the Depigmented (Leucodermic) Patches of Vitiligo when they are added to Mole-like Nævi.—In a paper on Acute Appendicitis in Children: 120 Consecutive Cases, Mr. W. A. Thompson, of Liverpool, discusses the diagnosis and treatment of this condition with details of his cases in tabular form.—Dr. W. G. Wyllie records a case of Amyotonia Congenita in a girl aged 4½, who had been kept under observation for three years, during which gradual improvement had taken place.—The abstracts from current literature are devoted to acute infectious diseases.

NEW INCOME-TAX PROVISIONS.

THE Finance Act, which has just come into force, contains a number of interesting provisions, the general effect of which is to lighten the burden upon the taxpayer in respect of certain classes or categories. So far as the changes concern medical men the saving will arise, not qua medical men, but as members of the taxpaying community in the following ways:—

1. The rate of tax remains at 4*s.* 6*d.* (reduced rate 2*s.* 3*d.*).

2. Inhabited house duty is wholly repealed, and this somewhat irritating impost will not again appear on the demand notes issued on the first day of each year.

3. The allowance of £45 given in respect of persons taking charge of widowers' and widows' children, or acting as housekeepers, and in respect of widowed mothers, &c., has been increased to £60. This concession is the result of some years of persistent endeavour to place the allowance on a more generous basis.

4. The allowance given to widowers or widows in respect of housekeepers may now be claimed irrespective of the handicapping condition formerly existing—viz., that there must be a child looked after by the housekeeper in respect of whom the child allowance had been given.

5. Where a taxpayer derives income from foreign possessions he now is entitled to ask for an adjustment of such income to the actual total amount of the first three years of assessment. Previously assessments could be made on the basis of that applicable to trades, professions, and vocations, without the adjustment to which the latter were entitled. This provision, therefore, merely places on the same basis the liability to tax.

6. In case it may be desired to retire to some country where taxation is less burdensome, it is fairly well known that one must cease to maintain a residence in this country. There are questions constantly arising, however, as to whether a person suffering tax may be regarded as residing or domiciled abroad, but in the past difficulties have arisen in appealing from the decision of the Board of Inland Revenue. It is now proposed, therefore, to give the taxpayer a right of appeal, on questions of domicile, ordinary residence and residence, to the Special Commissioners, from whom further appeal may be made to the High Court.

7. Repayment of income-tax is now to be made at the standard rate of tax for the year or at half that rate as the case may be. Where, however, a person proves that, by reason of the deductions to which he is entitled, he has no taxable income, repayment will be made of the whole of the tax paid or suffered by him.

8. A collector of taxes is now empowered to recover summarily amounts of tax under £50, which presumably means that more cases of arrears will appear in the limelight than in the past.

9. The recipients of dividends have often been mystified by the "explanatory" hieroglyphics preceding the net rate of payment per share on dividend warrants. This difficulty is now to be remedied, and after Nov. 30th next dividend warrants must show the gross and net amounts and the rate and amount of tax deducted.

THE LANCET.

LONDON: SATURDAY, SEPTEMBER 13, 1924.

NEW REMEDIES.

FOR practitioners who began their medical careers a few decades ago the choice of drugs was practically limited to vegetable substances and chemical products, most of which had been prescribed in one form or another by their predecessors, sometimes through many generations. If some of these practitioners are of opinion that materia medica has been enlarged at too rapid a rate during the past quarter of a century, although the production of novelties was suspended in some directions during the war, their attitude is a quite reasonable one when it is based upon the feeling that mere novelty is not necessarily a recommendation. To-day inventiveness is again receiving full play in many chemical laboratories, and in the near future it is certain that many therapeutic substances which were unknown 30 years ago will claim employment in place of numerous drugs now usually employed. The inventiveness will require watching, and this was the notable lesson which emerged from the deliberations of the recent British Pharmaceutical Conference.

There is a law of economics that bad money drives good money out of circulation. We must take care lest this law apply itself to medicine. The Germans, before the war, were prominent in the art of inventing new drugs; in the huge laboratories on the Rhine hundreds of highly skilled chemists were engaged in the work of revolutionising therapeutics, and from the factories, of which these laboratories formed part, series upon series of new synthetic products were thrown on the world's markets, and it is commonly acknowledged that these German chemists rendered an inestimable service to medicine. It is known that the great anilin dye works on the Rhine exercised strict precautions before they introduced new substances to the medical profession; they utilised the means at their disposal for ensuring scientific accuracy and making clinical tests. We enjoy the results of their enterprise and research in series of products which are regularly prescribed by medical men everywhere. There are great British and American firms who work on similar lines and whose results are scrupulously checked by medical authority. There arise, of course, quacks and imitators, inside and outside Germany, whose inventiveness is restricted largely to nomenclature; selling the same thing under many names, they claim for their multiple-titled drugs virtues which the actual inventors of the substances never claim, and so help to bring into disrepute reputable goods. But having paid due respect to enterprise, we may ask the question whether it is desirable in the interests of medicine to be content with a situation which places us unreservedly in the hands of enterprising commercial houses, all of which are not equally supplied with medical information. In his presidential address to the British Pharmaceutical Conference, Mr. EDMUND WHITE said: "At the present time there is no public authority specially charged with the examination and standardisation of remedies by physiological or biological methods. There is no public laboratory where any firm or person inventing a new remedy can have such substances tried and examined, nor is there a laboratory where a pharmacist making his own preparations can have them examined by physiological methods to determine their potency." Our attention has been drawn to this position by a letter in the *Pharmaceutical Journal* from Dr. F. E. STEWART, who on previous occasions has advocated the organisation in America of some such institution as Mr. WHITE would have established.

Dr. STEWART's opinion is that a new remedy is not fitted for clinical test by physicians in hospital or private practice until "standardisation" by an official body is effected. Perhaps standardisation is hardly the *mot juste*, since it is at least doubtful if it would be possible in every case, but there is undoubtedly a great need for a central clearing-house for new medicinal substances. It is hardly fair to throw on business firms the enormous responsibility which some of them are more willing than able to shoulder. In the United States it has been suggested that new remedies should be manufactured under licence, and such a plan is now being put into practice there in connexion with the introduction of pneumococcus antibody solution under the professional control of the "Influenza Commission" set up by the Health Department of the United States Government. This is similar to the plan carried out by the University of Toronto for the manufacture of insulin, and schemes such as these are conceived on the right lines. But a more comprehensive system is needed to form a connecting link between the producers of new remedies and those who prescribe them, and such a scheme should include provision for the testing and recording of clinical experience. The grave professional difficulties arising here are clear to all our readers, but to some extent they should not be insuperable.

A CASE OF LATENT LEPROSY.

THE incubation period of leprosy has been a continual source of speculation for those who have studied this terrible disease. It has been recognised for some time past that the lepra bacillus may be dormant in the human body for a period of years; but it is from a study of those cases—and several have been recorded—which arise in countries where this disease is no longer endemic that the most accurate data are obtainable. Such a case has recently been seen in London in which a woman developed leprosy after an incubation period of eight years, but here the source of infection was easily ascertainable. The remarkable instance of extreme latency, reported by Sir NORMAN WALKER in our present issue, may well constitute a record. The incubation period in this instance must have been one of 40 years, for the patient, a Russian Jewess, had resided in Scotland for the whole of that period without exhibiting any evidences of the disease. The source of infection being unascertainable, it must be inferred that the organisms were present in her body the whole of that lengthy period. The last British leper of indigenous origin is known to have died in Shetland in 1798, and about the middle of last century an instance of a man contracting leprosy in Ireland was recorded by the late Sir HAWTREY BENSON. This man contracted the disease, as was made abundantly clear, by wearing the cast-off clothing of his brother who had died of leprosy.

The coloured plate which illustrates Sir NORMAN WALKER'S article vividly portrays the improvement in the nodules which followed the treatment adopted. The leprosy bacillus, as is well known, has not yet been cultivated on artificial media, so that in preparing a vaccine recourse had to be made to a triturated

nodule which had been excised. The emulsion was heated to 60° C. for half an hour and diluted with carbol saline, which was injected in the doses of 1 c.cm. weekly, containing approximately 200 million leprosy bacilli. The difficulty in assessing at its true value the effect of any particular treatment in a given case of nodular leprosy is very great. Partial resolution of the nodules has been claimed as the result of many different forms of treatment. Similar success has been recorded with chaulmoogra, with its salts, the gynocardates and hydnocarpates of soda, by DEYCKE with nastin—a vaccine prepared from a streptothrix grown from leprotic nodules—and with injections of antimony. Caution is necessary, for Dr. E. MUIR and others have shown that at certain periods the leprotic process may become stationary and that under appropriate hygienic and dietetic conditions the disease may be ameliorated in a remarkable manner, at any rate for a time.

LONDON WATER.

THE eighteenth annual report [1] of the Metropolitan Water Board contains the results of the chemical and bacteriological examination of the London waters for the 12 months ended March 31st, 1924. As in previous years, Sir ALEXANDER HOUSTON begins by setting out how the immense task of providing nearly seven million persons with water fit to drink is carried out with such apparent ease and regularity. This year he indulges in a little legitimate boasting in view of the vast army of strangers who are visiting the British Empire Exhibition at Wembley without anxiety as to their supply of drinking water; he infers that there is no other large populated centre in the world which can afford the same amenities. The Director of Water Examination does not let his readers take for granted everything that has appeared in previous reports, and he asks this year the rhetorical question: Why is it necessary to purify water at all?—in order to set out again some of the reasons, physical, sentimental, and hygienic, which determine the answer. Although, as he says, many people have an almost invincible repugnance to the addition of any chemical to water destined to be used for drinking purposes, yet medication has now become an accepted practice, whether as lime for softening or hardening waters, alum for clarification, oxidising filters for removal of iron, permanganate for taste, copper sulphate to kill algæ, and so forth. In an interesting section he foreshadows the possible addition to London water of the modicum of iodine required to prevent the development of goitre, recalling Dr. C. N. ATLEE'S recent observation that 34 out of 895 unselected boys under the age of 12 in a south-eastern quarter of London had thyroid enlargement and 43 out of 944 girls, respectively 3·8 and 4·5 per cent. of children examined. The prophylactic experiment, carried out at Rochester, U.S.A., of artificially iodising the water-supply twice a year for a period of about two or three weeks, opens up a vista of possibilities of conveying to consumers in their water-supply substances of preventive or curative nature. The experiment costs Rochester only £357 a year on a daily consumption of some millions of gallons. To think of a water-supply in the light of a preventive of disease is a new and attractive idea.

Water-borne infectious disease is still a very complex question. Generally speaking, Sir ALEXANDER HOUSTON writes, it is very hard to associate typhoid fever causatively with water-supply in this country. Despite laborious effort, he has failed to isolate the typhoid bacillus from sewage or from impure river water before purification. Indirectly, he has arrived at the rough-and-ready rule that any volume whatever of any water-supply, which contains no more than 704 excremental bacteria, can reasonably be supposed not to harbour the typhoid bacillus in that volume; and he goes on to consider the question of the number of bacilli necessary to start an infective process. Theoretically, of course, one may suffice, but, even should typhoid bacilli be present in a water-supply, infection would not necessarily result so long as they do not occur in clumps or masses, but are so few and evenly distributed that no single draught of water can contain more than a single germ. Unfortunately, however, waters showing no gross signs of bacterial pollution, as judged by ordinary standards, have been the means of causing widespread disease. There is only one safe course to adopt—namely, to regard as anathema all adventitious water entering a supply during and after purification. Once having entered the custody of a water-works authority, water should be regarded as sacred until it has reached the consumer in a condition of proven safety. An unexpected attack on London water has recently been made by the sea-gull, which seems to be changing its habits and to be finding land waters more attractive than the seashore. Photographs reproduced in the report show a hundred or more gulls flying over a single filter, and although, so far as is known, gulls do not suffer from the water-borne diseases which afflict human beings, their droppings produce an excremental pollution which cannot at present be differentiated from contamination of human origin. The Board's engineering department has recently organised a system of frightening away the birds by frequent firing of blank cartridges, but apparently the sea-gull must be reckoned with as a permanent invader of the solitude of reservoirs which have hitherto been the nesting-ground of such comparatively rare birds as the great crested grebe. The report is both learned and entertaining, and contains matters with which every citizen of Greater London should be familiar. In octavo form at a third the price it might obtain the readers it deserves, though we can see that the production was costly.

[1] London: P. S. King and Son, Ltd., 2, Great Smith-street, Westminster. 15s.

TOXIC EFFECTS OF EXHAUST GAS.

IN the current number of THE LANCET is a paper by Dr. D. B. Blacklock and Dr. W. H. Peacock on the destruction of wild rats by means of the exhaust gas of the petrol engine. In the *Times* of July 9th, 1924, a verdict of death by misadventure was recorded by a coroner on a man who was found dead on the floor of a garage close to the exhaust outlet of a motor-car. The engine was running. The composition of exhaust gas of internal combustion engines is therefore important, and the analysis made by Hopkinson and Morse at Cambridge given in the table, shows that the efficiency of the engine as indicated by the brake load did not vary very much with the varying amounts of petrol used. The analysis of the exhaust gas varied considerably. According to Judge [1] the mixture which gives the nearest resemblance to perfect combustion—i.e., complete oxidation of all the carbon and hydrogen of the petrol—is 14·75 parts of air to 1 part of petrol, and even then traces of carbon monoxide are formed. Such proportions probably occurred under the conditions given in column 2 of the table. If the ratio is lessened to, say, 12 or 10 parts of air to 1 of petrol, combustion is incomplete and CO and H make their appearance in quantities propor-

[1] High Speed Internal Combustion Engines, 1916.

tional to the diminution of the ratio, and are accompanied at the same time by a diminution of carbon dioxide. If the ratio is increased to, say, 18 to 1 the excess of air damps the explosion in the cylinder and the flame of the explosion does not spread throughout the cylinder with a result that unburnt petrol appears in the exhaust gas. Probably, also, if the ratio is lessened to an extreme extent petrol may appear in the exhaust gas. It is, therefore, conceivably possible, dealing only with the subject of exhaust gas, that death of an individual may be caused by (1) petrol fumes, (2) carbon monoxide (carbonic oxide), or (3) a mixture of the two conditions. The first possibility is an uncommon one owing to the rapid dilution of the vapours with the surrounding air and the relatively small percentage of petrol in the exhaust gas. Further, the running of an engine under such conditions is likely to damage seriously the working parts. In the second case it is easy to see that a comparatively small alteration in the proportions of air and petrol will lead to the production of CO in proportion to the ratio of air to petrol. According to Haldane the presence of 0·05 per cent. of CO in the atmosphere will produce distinct toxic symptoms, 0·2 per cent. will produce urgent symptoms, and 1 per cent. is usually regarded as a possible fatal mixture. As the exhaust gas may contain as much as 11·6 per cent. of CO, it is not surprising that anyone remaining in a closed garage may easily succumb to poisoning from CO.

Analysis of Exhaust Gas of a 20 h.p. Daimler Four-cylinder Engine.

Petrol consumption per 1000 revolutions in lbs.		0·181	0·191	0·197	0·217	0·250	0·293
Brake load at 43 inches radius in lbs.		25·0	27·5	29·3	29·4	29·3	27·0
Measured amounts of the exhaust gas reckoned as per cent. of the volume of dry exhaust gas ..	CO_2	10·9	12·8	13·5	10·6	9·6	6·0
	CO	Nil.	Nil.	0·7	5·0	6·25	11·6
	O	3·6	1·5	0·2	Nil.	Nil.	Nil.
	H	Nil.	Nil.	Nil.	2·1	2·65	8·7
	N	84·0	84·0	84·0	81·0	80·0	73·0
Total O as obtained by dividing N by 3·76 as per cent.		22·4	22·4	22·4	21·5	21·3	19·4
Steam as per cent. calculated		15·8	16·2	16·8	16·8	17·2	15·2

CO_2 = carbon dioxide. CO = carbon monoxide. O = oxygen. H = hydrogen. N = nitrogen.

In THE LANCET [2] references to cases of poisoning by exhaust gases have been given, and the various writers are by no means in agreement as to the cause of death. In one series of 42 cases described by Dr. G. W. Johnson in Canada, he is of opinion that petrol fumes were the cause of death and not CO, and he quotes spectroscopic examination of the blood and animal experiment in support of his statements. However, whilst not being able to exclude poisoning by petrol or by decomposition products other than CO, it seems to be impossible to exclude CO at all events as a partial factor in these cases. The examination of the blood spectroscopically in these cases for CO is of great value when a positive result is obtained, but "death may occur before the hæmoglobin becomes sufficiently charged with CO as to afford spectroscopic evidence of its presence,"[3] chiefly owing to the masking of the CO bands by oxyhæmoglobin and reduced hæmoglobin. The post-mortem appearance of the internal organs is usually characteristic, as also their resistance to putrefaction, but in some cases where death occurs rapidly, or where the patient has lived some days after exposure to CO, the post-mortem appearances are so indefinite that a certain diagnosis of CO poisoning at post-mortem becomes impossible.

[2] THE LANCET, April 5th, 1913; Jan. 27th, 1917; Oct. 12th, 1918; June 19th, 1920.
[3] Dixon Mann: Forensic Medicine and Toxicology.

In the article by Drs. Blacklock and Peacock it seems probable that the lethal effect of the exhaust gas was due to CO. It is a little unfortunate that no detailed account of the symptoms displayed by the rats is given and that no details of post-mortem examinations on the rats are available. The fact that the rats were not driven out of the drain is suggestive of CO poisoning, as, of course, this gas is odourless and tasteless and not in any way irritant. Again, when the motor-launch was used the exhaust gas was mixed with water and no impairment of the lethal effect was noticed. Under such conditions many substances, such as petrol vapour, would be removed by the water, but CO being only slightly soluble in water would be discharged in the exhaust gas unchanged. Nevertheless, it is conceivable that some decomposition product of petrol and air other than CO may be concerned, but no suggestion of any such compound is mentioned in the treatises on internal combustion engines with the exception of minute traces of aldehydes. If the effects on rats were really brought about by CO, the internal combustion engine appears to be a rather inefficient and uneconomic source of CO, if any other is available.

Annotations.

"Ne quid nimis."

MEAT INSPECTION IN SCOTLAND.

ADEQUATE supervision of meat intended for human consumption is a subject upon which public health authorities have for years concentrated much criticism, but without obtaining any advance in procedure. All recognise that present conditions in England are supremely unsatisfactory, involving great inequalities and great injustices. In some areas keen and efficient supervision is exercised, in others there is hardly any supervision. This is bad alike for the public, the meat industry, and the local authorities. In the United Kingdom, Scotland has led the way in establishing a system of uniformity of inspection and judgment. These are dealt with in the Public Health (Meat) Regulations (Scotland), 1924. Dr. Gerald Leighton has recently published a useful handbook,[1] mainly intended for meat inspectors and others officially concerned, as a guide and explanation of these regulations. The essential principles adopted are worthy of study. Two classes of inspection officer are recognised—meat inspectors and detention officers. A meat inspector is no longer to be any person who is entrusted with the duty of inspecting meat, irrespective of his competency, but one who possesses certain definite qualifications. As defined, it includes the medical officer of health of the district, or a veterinary surgeon, or a person who has received special training in the work of meat inspection, and, prior to June 1st, 1923, has had not less than seven years' practical experience in this work and has obtained from the Scottish Board of Health a certificate of qualification. The "detention officer" is an innovation, and is any person possessing certain qualifications who is appointed by the local authority for this purpose. The qualifications required are such experience and training as the meat inspector of the district may consider necessary to enable him to recognise any departure from the normal in the carcass, organs, or viscera of an animal. His duty is to detain, and neither to seize nor condemn. These powers rest with the meat inspector, who must be trained, and as Dr. Leighton remarks, the new regulation "cuts out once and for all the placing in the hands of utterly incompetent persons the important duty of inspecting meat."

[1] Pocket Handbook of Meat Inspection: A Guide to the Public Health (Meat) Regulations (Scotland), 1924. By Gerald Leighton, M.D., F.R.S.E., Medical Officer (Foods) Scottish Board of Health. London and Edinburgh: William Hodge and Co., Ltd. 1924. Pp. 126. 6s.

As regards public abattoirs detailed records have to be kept; the actual form of record is not specified, but they must be such as are approved by the central authority. Private slaughter-houses have to be licensed every year. The control over killing in these private slaughter-houses is effected by granting the licence with conditions that slaughtering shall only be carried out on specified days and at specified hours. This condition has frequently been stressed by medical officers of health as the only practicable way to supervise meat in private slaughter-houses. Killing at other times is only permissible on giving special notice, with a clause excluding from the condition immediate slaughter necessitated by accident or illness. The dangerous possibilities of this concession dealing with emergency slaughter are guarded against by regulations requiring prompt notice to be given to the clerk of the local authority and by making it the duty of the meat inspector or detention officer to inspect within 24 hours. The owner has to preserve the carcass and organs undetached for this period if necessary. The rather vexed question of meat stamping is also dealt with and a compromise is effected; stamping is not made compulsory, but local authorities are authorised to stamp meat, subject to the approval of the Scottish Board of Health.

The control over the preparation, storage, and sale of made meat products, such as brawn, sausages, and the like, is, perhaps, outside the scope of the regulations, but is not entirely neglected. These foods are included in the definition of "meat food product," and one regulation requires that meat or meat food products must not be stored in any premises that are not kept in a clean and sanitary condition. The regulations do not appear, however, to include any conditions governing the preparation and supervision over these meat food products. At present such regulations are badly needed. Another regulation of interest is one which requires that every local authority shall keep a register of all cold stores within their district, the register to include the recording of a number of essential details. The extremely important subject of uniformity of inspection and of the pathological conditions which justify seizure is dealt with by setting out such conditions in detail in the first schedule. Dr. Leighton remarks that it occupies only about five pages of print, but that "in those five pages is included the whole duty of an inspector of meat." It is evident that these directions have been compiled with great care and by men of practical experience. As an illustration the conditions which justify seizure of the whole animal, or only specified parts, in cases of tuberculosis are set out with great clearness.

No one can study the regulations without appreciation of the thorough way in which the subject has been investigated, with careful anticipation of practical difficulties. Dr. Leighton has added to the debt by his succinct discussion of the meaning and objects of the regulations which constitute a public health reform of great value. He points out that an important factor in their initiation and practicability is the fact that over 90 per cent. of the total consumption of home-killed meat in Scotland is dealt with in public abattoirs. There seem no insuperable reasons why similar regulations should not be adopted in England, but it would appear that the scientific administrative procedure could not be initiated without new legislation. For example, that hoary anachronism, the "registered" slaughter-house, usually including the worst slaughter-houses in the area, stands on the authority of an Act of Parliament. The simple solution of allowing slaughtering only at prescribed times as a condition of licensing cannot prevail for these slaughter-houses since no licensing is required. Most of the bad meat trade centres in the rural areas and it is in these that powers to regulate are so deficient. It is of limited value to adopt a uniform standard of judgment for meat unless also a better administrative machine is evolved for English conditions. The Scottish machinery provides an admirable example.

THE PROGRESS OF MAN.

ANOTHER volume in a series of little books entitled "Today and Tomorrow" has appeared in sequence to Mr. J. B. S. Haldane's "Dædalus" and Mr. Bertrand Russell's "Icarus," the former of which purported to expose the promises of science, especially of biography, while the latter dwelt upon the sinister possibilities which accompany scientific developments, threatening to make of man's new wisdom an engine destructive to man. "Tantalus"[1] is intended to provide an antidote to much learned pessimism, but Dr. Schiller starts gloomily enough with the premise that man has always in the course of his ascertained history been placed in the dilemma that as fast as his ingenuity might bring him nearer happiness his failings perverted the knowledge before his virtues allowed him to employ it rightly. The happier message of "Tantalus" is that, given time in which its effects can work, we have in the science of eugenics an escape from the impasse. And the leaders of this science must accustom themselves, we gather, to look steadily backwards as well as forwards, man having ceased, biologically speaking, to be a progressive species. The argument here relies on the magnificent physique of the Cro-Magnon people of the Aurignacian Age, and as to this we have remarkable contemporary evidence. Truth in the sense of accurate portrayal of what is observed by eye was well known to primitive man, whose sense of beauty was, however, not ours. But their sense of truth was as keen as our own. This is apparent to all those who have examined prehistoric sculpture and cave-painting in the Abri de Laussel in Dordogne or in the caves of Spain. Early man was an accurate reproducer of what we should consider to-day execrable human models, but there is a probability that he admired what he reproduced.

The cave of Laussel was first examined in 1908 by M. Gaston Lalanne, who described his discoveries in *L'Anthropologie* in 1912, with reproductions of the rude sculptures of the Upper Aurignacian epoch of from 25,000 to 40,000 years before the advent of historic civilisation. These sculptures chiefly represent nude female figures of the steatopygous type found among lowly African races. Every feature of the female figure is here depraved to modern civilised thinking. The breasts are enormous and pendant, the hips extraordinarily wide, the abdomen superficially vast, the whole figure stunted. In strange contrast to these almost infra-human types there was found on one wall the figure of a tall and well-formed man. Lalanne was of opinion that the man was an archer in the act of drawing a bow, but certain details in the bas-relief have lately led to different conclusions. These are well set out by Prof. Dr. P. Shiefferdecker, of Bonn, in an article entitled "Ueber ein Bildwerk aus der Urzeit," contributed by him to Vol. II. of the "Libro en Honor de D. S. Ramón y Cajal," published by the admirers of the famous Spanish surgeon and man of science. Taking the figure of the supposed archer as his theme, Schiefferdecker shows that this tall man is one of a group of three who are engaged in the kind of contention of which the prime example in history is the Rape of the Sabines. There are two tall men, and they are fighting at the mouth of a small cave for the possession of one small woman; the archer is curving his arm round her diminutive figure, protecting or withdrawing her from the other man. The men are manifestly beings of a larger race than the woman, and it is conjectured that they are specimens of that gigantic Cro-Magnon race, which in brain-capacity and stature so surpassed any subsequent Europeans. The crouching, cowering woman, on the other hand, is conjectured to be a surviving Neanderthalian, one of that ape-like tribe that possessed Europe prior to the arrival on the ethnologic scene of the Cro-Magnons. These races are believed to have overlapped, and both to have disappeared as a whole, but to have left traces in our physical make-up. The female figure, taken in conjunction with neigh-

[1] Tantalus. By F. C. S. Schiller, M.A., D.Sc. 1924. Kegan Paul. Pp. 72. 2s. 6d.

bouring sculptures representing women, suggests to the anatomist that the human figure has vastly changed since her remote epoch, but the sculptured men on either side of her at once belie this supposition, for they are tall, symmetrical, despite the rudeness of their representation, and one at least is surmounted with a finely developed skull. It is conceivable that the men represented in the Laussel sculpture were invaders who, like the earliest Saxon and Danish invaders in England, brought none of their womenkind with them and were compelled to fight each other for the cave-women of Neanderthal type.

AIR EMBOLISM IN OBSTETRICS.

IN a paper read before the Chicago Gynecological Society, Dr. James A. Gough,[1] who reports an illustrative case, remarks that the significance of air embolism in obstetrics was first recognised in 1829 by Legallois, who suggested that the entrance of air into the uterine veins might be a source of danger in recently delivered women. Since then many cases have been reported, but the extreme infrequency of the condition is shown by the fact that Opitz never had a case among 4500 deliveries. As many of the recorded cases of supposed gas embolism were published before the dawn of the bacteriological era, it is reasonable to suppose that a certain proportion of them were of microbic origin. Welch and Flexner in 1896 studied several cases in which the presence of gas at the autopsy had been considered evidence of air embolism, but which they demonstrated were due to the agency of gas-producing organisms. Dr. Gough's case was that of a II.-para, aged 25, in whom episiotomy was performed under light ether anæsthesia. Collapse took place immediately after the operation, and death occurred seven hours after delivery, respiratory failure and deep cyanosis preceding cessation of the heart's action. The necropsy, which was made nine hours after death, showed that the right ventricle was markedly dilated and had flabby walls which appeared transparent. When opened under water the right ventricle was found to contain much free air, and frothy blood also escaped from it. Frothy blood was also found in the pulmonary artery, but the blood elsewhere did not contain air, and there were no signs of post-mortem decomposition. On histological examination there was no evidence of gas bacillus infection, and examination of the blood showed no bacteria. The case therefore appeared to be a genuine example of air embolism following delivery.

MEDICAL INCUNABULA.

EARLY printed books have evoked greater interest of late years among collectors of historic medical literature than at any previous period. In a recent sale at Messrs. Sotheby's as many as 50 early printed works on medicine and surgery were put up to auction, and some of these will doubtless soon reappear on the shelves of the booksellers. In Catalogue 22, issued by the International Antiquariaat of Amsterdam (Menno Hertzberger), we find nine incunabula offered for sale, to each of which an interesting bibliographical history attaches. Conspicuous among these nine is the Celsus published by Pachol and Scinzenzeler at Milan in 1481. This, the second edition, is considerably rarer than the first. The book was apparently not seen by Hain or Proctor, those indefatigable bibliographers, but was known in 1764 to De Bure, who speaks of it as "encore rare et recherchée des curieux" in his "Bibliographie Instructive." He catalogues also at great length the first edition of Celsus, pointing out that his predecessors have been in the habit of dating it 1475 instead of 1478, owing to their not having looked closely enough at the curiously printed year of publication in the colophon or end-title. De Bure, one of a family of Paris booksellers who became famous for their catalogues of the libraries of a learned period, claims to have put on record the greater part of the books issued in the republic of letters since the invention of printing, but he only mentions some 14 medical incunabula. And this proves that bibliography, and, by inference, collecting had not progressed far in his day. Ideas as to value are relative. He, for instance, considers the first edition of Celsus to be *fort rare*. The present age, with its far larger outlook on the republic of letters, has decided in favour of the second. The beautiful, tall, clean, and unwashed copy, now on sale at the International Antiquariaat, is offered for 450 guilders.

In the same catalogue among the nine medical incunabula we note Hartmann Schedels's "Liber Chronicarum," printed at Nuremburg by Anth. Koberger in 1493. It is a folio with clasps, and besides being considered the crown of mediæval craftsmanship in bookbinding, is illustrated with more than 1800 fine woodcuts by the teachers of Dürer—namely, Wohlgemut and Pleydenwurff. A number of famous medical authors from Alexander to Trusianus are mentioned in its pages, and there are references to the finding of the body of a giant, to *lues* on a great scale, to a monster in Gascony, to the names of known human monsters, to a chicken with four legs in France, and to the Seven Sleepers of Christendom. This fine copy with large margins is in the original calf binding with clasps, and contains the three blank pages and the discourse on Sarmatia usually missing. The price is 650 guilders. Book illustrations of the Dürer school are always admirable, and when the subject is medical, as when baths, hospitals, operations, and anatomy lessons are depicted, they are often of great historic value. Some of the best ancient medical woodcuts adorn title-pages, and would appear to have a mystical significance. In these title-pages vignettes illustrative of medical life are often to be found, and deserve detailed study. A catalogue of more than 150 such title-pages has been prepared at the library of the Royal College of Surgeons of England.

ADRENALIN AS AN ANALGESIC.

IN a comprehensive, even discursive, article[1] Dr. D. Paulian, of Bucharest, discusses the action of anæsthetics in general, and of adrenalin in particular. Such drugs as antipyrin, salicylates, and morphine, on the evolution of a common cold he suggests act like sleep, reducing the phenomena of inflammation, for the time being at any rate, by diminishing the conductivity of the sensory nerves. It has been argued that salicylates are effective in certain diseases, mainly because they block impulses which, in their absence, would travel by the sensory nerves to the central nervous system. Indeed, it has been shown that aspirin and atophan are antifebrile simply because they reduce the excitability of the central nervous system. At Prof. Marinesco's hospital in Bucharest Dr. Paulian has been investigating the action of adrenalin on the gastric crises of tabes. Of its ability to mitigate these crises and relieve the lightning pains of tabes there could be no doubt; of its mode of action it was difficult to be certain, but Dr. Paulian considers as plausible the hypothesis that the favourable effect of adrenalin depends in such cases on a rise of blood pressure. He has found that in all cases of tabes associated with disease of the aorta the arterial pressure is below normal, and this hypotension is exaggerated during gastric crises and attacks of lightning pain. He has noticed that the relief obtained by an injection of adrenalin during a gastric crisis is accompanied by an appreciable rise of the blood pressure, and he is inclined to think that the best explanation of the asthenia of tabes is to be sought in its concomitant hypotension. Whatever the explanation, it seems clear that adrenalin is a rapid and effective remedy for gastric crises, and though it is most potent when given by subcutaneous injection, it is not absolutely inert when given by the mouth. One of Dr. Paulian's

[1] Surgery, Gynecology, and Obstetrics, July, 1924.

[1] Paris Médical, August 9th, 1924.

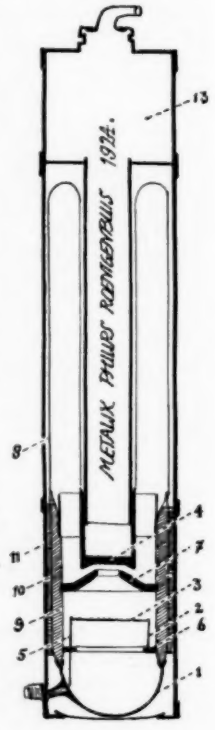
patients was an army officer who used to be aroused at 5 o'clock every morning by an irresistible desire to go to stool. He was able to abort these attacks as soon as they began by swallowing 10 drops of adrenalin. In neuralgia of the sciatic nerve and in rheumatic affections of the joints adrenalin has been found remarkably efficacious, even when the rheumatism has been complicated by effusions into joints. It may be that adrenalin is beneficial in tabes because the action of the suprarenals is defective; such an hypothesis would explain the general weakness and many of the other symptoms of tabes. Whatever the mechanism of adrenalin artificially introduced into the body may be, there can be no doubt as to the analgesia and euphoria which it creates, and in this respect it assuredly deserves more attention than it has hitherto received from physiologists and physicians.

PREGNANCY AND PULMONARY TUBERCULOSIS.

AT the fourth meeting of the International Union against Tuberculosis held in July at Lausanne, interesting discussions centred around a paper read by Prof. Calmette on the possibility of virulent tubercle bacilli being evolved from avirulent germs, a paper by Prof. Sahli on the defences of the organism against the tubercle bacillus, a paper by Prof. H. Forssner on the relation of pregnancy to tuberculosis, a paper by Prof. L. Bernard on the prevention of tuberculosis in infancy, and a paper by Sir Robert Philip on the decline in the tuberculosis mortality resulting from the organisation of tuberculosis campaigns in different countries. The International Union against Tuberculosis has its headquarters in Paris at the office of the League of Red Cross Societies, which also houses the secretariat of two other international societies combating venereal disease and cancer respectively. It would be difficult to over-estimate the importance of this centralisation of international movements against three of the principal groups of diseases, the inter-relations of which deserve the closest study. The paper by Prof. Forssner on the alleged influence of pregnancy on tuberculosis drew comments, mostly favourable, from many of his audience, and this was the more remarkable as his conclusions would have been generally regarded as hopelessly unorthodox only a few years ago. His thesis that "a pregnancy continuing till term is no more dangerous for first-stage tuberculous women than for healthy women, and by not interrupting this pregnancy we obtain for the race healthy children, just as viable as other children," was supported by much carefully sifted evidence. His material consisted of women treated in the tuberculosis dispensaries of Stockholm and, in a certain proportion of cases, recently confined in maternity hospitals. The Swedish National League against Tuberculosis financed for six years a systematic examination of all the women confined in two maternity hospitals in Stockholm. Of more than 30,000 women thus examined, 1500 were kept under observation on account of the diagnosis or suspicion of tuberculosis, and 341 women who suffered from pulmonary tuberculosis, and who were kept under medical supervision for more than a year after confinement (usually for two years or more), were compared with 396 women whose pulmonary tuberculosis was not complicated by pregnancy. After a two years' observation period, the non-pregnant women in Turban's first stage were compared with the women who had been pregnant and had also been in the first stage of the disease. It was found that the disease was stationary or the patients had improved in 59 per cent. of the first class, and in 60 per cent. of the second class. Only a slight difference in favour of the non-pregnant patients could be found in those whose disease was in the second and third stages. As for the influence of the mother's tuberculosis on the health of her child at birth, it was found that the average weight of the infants of sputum-positive mothers was equal to that of the infants of healthy mothers. There can be little doubt that Prof. Forssner's paper and the confirmation which his views received in Lausanne last month will do much to check the practice, fairly common in some countries, of inducing abortion in the subjects of pulmonary tuberculosis on the assumption that (1) the prospective mother's health will benefit, and (2) the value of her progeny will prove negligible. Prof. Forssner's paper will shortly appear in the *Bulletin* of the International Union.

A NEW X RAY TUBE.

OUR Dutch correspondent sends us an account of an X ray tube recently placed upon the market by the firm of Philips, in Eindhoven, and called by them "Metalix." One of the first trial tubes was recently seen in action by the visiting tuberculosis specialists at Dr. Bronkhorst's sanatorium in Apeldoorn, and the tube was demonstrated at the factory to foreign medical officers of health, who expressed surprise at its appearance. The new tube consists of a cylinder 40 cm. long and 6 cm. in diameter which, through regulation of the current, can be made to give larger or smaller doses of hard or soft rays. These leave the tube in one direction only, through a window in the base. The lining of the tube consists of three layers — chrome iron, lead, and copper—of such thickness that less than one-millionth part of the total energy passes out to be lost or to harm the operator. The space within which the discharge takes place is lined entirely by metal which forms part of the cathode and can be earthed, so that the patient can touch the tube without danger, provided that the transformer is also earthed. The tube can thus be brought without hesitation close up to the object to be X rayed, and as it gives a sharp and fine picture a relatively small current can be used. At present two kinds of tube have been placed on the market: Metalix A, for odontological use, with a maximum voltage of 50,000 and 9 cm. spark-gap, the maximum continuous charge being 5 milliamps, or 15 milliamps for 20 seconds; Metalix B, for radiography and radioscopy, with a maximum voltage of 65,000 and 13 cm. spark-gap, the maximum continuous charge being 8 milliamps or 50 milliamps during a short time. The price of these tubes is stated not to be higher than that of the ordinary Coolidge tube. In the sectional plan the luminous wire (3) is seen stretched between two poles, one of which (2) is in contact with the metallic lining of the tube, and thus can be earthed, the other (5) being insulated. From the luminous wire electrons are sent out into the space bounded by the metallic plates (6) and (7) and by the lining of the tube. Plate (7) contains an opening of such shape and size that the positive field of the anticathode behind it is sufficient to throw electrons from the cathode on the tungsten spiral (4) at a speed determined by the difference of tension existing between the cathode and anticathode. The size of the opening in plate (7) determines at the same time the



diameter of the pencil of X rays. These leave in the direction of the axis through the glass window (1) in the base of the tube. An unevenness of the tungsten spiral thus has no unfavourable effect, while the luminous wire is so thin as scarcely to intercept any rays from the anticathode, and no shadow from the wire is cast on the plate. The three insulating layers of the cylinder are shown: chrome iron (9), lead (10), copper (11), while (8) is a glass tube which isolates the anticathode from the cathode. Cooling takes place by filling the space (13) with water. Experiments have been made with tubes of similar type for deep therapy and are likely soon to be placed on the market. It is clear to us that this Dutch tube presents features not possessed by other tubes. It contains its own device for protecting the operator from extraneous rays, the wall of the tube is practically impervious to the rays, and only those which are used pass out. The shape of the tube allows readier approximation to the body, especially in the less accessible regions, while the earthing of the cathode renders it safe for the patient or operator to touch the tube without risk when it is being worked. Radiologists would certainly do well to examine this tube for themselves.

AN EASTERN CLAN.

THE Palaungs are a tribe living in the district of Tawnpeng, which lies in the Shan States about longitude 97° E. and around the twenty-third parallel of N. lat. They are a little-known race and untouched by Western ideas, and as Mrs. Leslie Milne says in the introduction to her book entitled "The Home of an Eastern Clan: A Study of the Palaungs of the Shan States"[1]: "The East is changing so rapidly . . . . that the customs of a people off the beaten track and as yet uninfluenced by contact with the West, are, I think, worth preserving." A vast amount of information about their psychology, religion, and social customs has been collected and arranged by Mrs. Milne. Her first task was naturally to learn the language, and she gives an amusing account of her difficulties. For instance, she had collected the Palaung words for "walk" and "run," "sit" and "stand," but not for "jump." So she jumped over a stick on the floor, and then down off a box. All the Palaungs present shouted "ru," which word she put down in her note-book as meaning "jump." But when she revised her notes with an interpreter she discovered that "ru" really meant "mad." Chapter XII. is devoted to medicine, charms, and omens. The religion of the Palaungs is Buddhist, but tinctured with much survival of spirit worship, and nearly all the ills of life are considered as due to evil spirits. Hence, treatment is mainly a matter of propitiating the evil spirit in question, though, in addition, sundry medicinal plants or animals, and minerals such as lime or wood ashes—i.e., potash—are used. The chapter on spirit worship is particularly interesting, and together with the portion of the book dealing with folk tales is one more proof of how popular beliefs are the same all over the world. On p. 352 is a story of possession by a "pok," which is a spirit living in a graveyard. Can it be that this name is the same as "Puck" or the Welsh name for a fairy—i.e., "pwci"? The story is that of an old woman who died, and after her death her children dressed her body in the habit of a Buddhist nun. Next day, while she lay in her coffin, knockings were heard, and the bystanders on opening the coffin found her apparently alive. She was helped out, set by the fire and given food, which she ate voraciously. She could not speak but only made strange sounds. A year passed and then a monk came to the relatives saying that the revived body was not really their mother, but only the dead body animated by a "pok." He gave them certain directions and on these being carried out the "pok" fled away, leaving only a loathsome corpse apparently dead a year. Let the reader compare this tale with that masterpiece of Stevenson, "Thrawn Janet," and note the curious resemblances. Both bodies after death animated by an evil spirit; both of them unable to speak intelligibly, and both freed from the spirit by the ministrations of a minister of religion. Not anthropologists alone, but all who are interested in the Empire to which they belong ought to be grateful to Mrs. Milne for this book.

[1] Oxford: At the Clarendon Press. 1924. Pp. 428. 16*s*.

BISMUTH IN EXPERIMENTAL SYPHILIS.

Ehrlich's successor, Prof. W. Kolle, has published an account[1] of the prophylactic use of arsenical preparations, mercury and bismuth, in experimental syphilis, and his observations in the case of the last-named drug are instructive. He anticipated that bismuth would not be more effective than mercury in rendering experimental animals resistant to infection, but to his surprise he found that mercury had only a transitory effect in this respect. When, however, he injected insoluble salts of bismuth which were retained in the body as depôts at the site of injection, it proved impossible to inoculate with syphilis successfully. In the case of 26 rabbits given an intramuscular injection of bismuth, followed by intra-testicular inoculations of spirochætes from two to fifteen weeks later, there was not a single instance of a chancre developing. X ray examinations showed that these insoluble salts of bismuth, including the carbonate which is quite insoluble in water, could remain for months embedded in the muscles into which they had been injected. Control tests carried out with 68 animals which had not been given preliminary treatment with bismuth showed that 94 per cent. of them developed a chancre at the site of inoculation. In another series of controls, where the animals had been treated with easily absorbed preparations of bismuth, refractoriness to infection was in most cases short-lived. The upshot of these observations would seem to be that a single bismuth "stopping" left in the body is capable of rendering it refractory to infection with syphilis for as long as four months. Prof. Kolle sounds a warning with regard to drawing hasty conclusions as to the applicability of his observations to man. It must first be shown that the bismuth-treated rabbits did not contract experimental syphilis in some latent guise which dispensed with a chancre at the site of inoculation. For, as in the case of prophylactic treatment with arsenical preparations, it is conceivable that resistance to infection may be acquired only up to a degree which does not exclude the development of an abortive form of syphilis. It is also, as Prof. Kolle points out, desirable that his experiments on rabbits should be repeated on monkeys, and that they should react in the same way before general conclusions are drawn as to the prophylactic value of bismuth. If man reacts like the rabbit in this matter to bismuth, it is obvious that a very important advance has been made toward the prophylaxis of syphilis in man.

[1] Deut. med. Woch., August 8th, 1924.

WE regret to record the death at Bournemouth, on Sept. 6th, of Sir Frederick Needham, Commissioner of the Board of Control, aged 88 years.

THE death occurred on Sept. 9th of Dr. Robert James Farman, secretary of the Panel and Local Medical Committees of the County of London.

CHARING CROSS HOSPITAL MEDICAL SCHOOL.—The distribution of prizes to the students will take place in the out-patients' hall of the hospital on Oct. 1st, at 3.30 P.M., by Sir Humphry Rolleston. Dr. W. Cecil Bosanquet, senior physician to the hospital, will be in the chair.

DIPLOMA IN PUBLIC HEALTH.—A course of lectures and demonstrations under the Metropolitan Asylums Board, dealing with hospital administration, will be given at the North-Western Hospital, Lawn-road, Hampstead, N.W., by Dr. E. W. Goodall on Mondays and Thursdays at 4.30 P.M. and alternate Saturdays at 10.30 A.M., beginning Thursday, Oct. 2nd, for a period of three months.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Comdr. J. M. Hayes to *Vivid*, for R.N. Barracks, and for specialist duties.

Surg. Lt.-Comdrs.: L. F. Strugnell, R. J. Inman, A. C. Anderson, R. P. Ninnis, J. D. Murphy, H. F. Stephen, G. E. Heath, and E. B. Kelley to *President*, addl., for five months' course of instruction; A. G. McKee to *President*, for course; S. R. Johnston to R.N. Sick Quarters, Dartmouth; and F. L. H. MacDowel to R.N. Hospl., Great Yarmouth.

Surg. Lt.-Comdr. (D.): R. R. Adams to *Pembroke*, temp., for R.N. Barracks.

Surg. Lts. (D.): H. J. Luck to *Victory*, for R.N. Barracks, temp., supy. (on *Warspite*, paying off).

T. J. Prendergast and C. Joiner to be Surg.-Lts., and apptd. to R.N. Hospl., Haslar, for course.

Temp. commission of Surg. Lt. C. Cotter terminated at own request.

ROYAL ARMY MEDICAL CORPS.

Lt.-Col. L. Cotterill, on attaining the age for compulsory retirement, is placed on ret. pay.

Maj. R. Storrs to be Lt.-Col., vice Lt.-Col. L. Cotterill, to ret. pay.

Maj. H. G. Monteith is restd. to the estabt.

Capt. J. G. Gill is granted the temp. rank of Maj. whilst empld. as Dep. Asst. Dir. of Hygiene and Pathology, N. Ireland Dist.

Lt. K. Fletcher-Barrett is restd. to the estabt.

MILITIA.

Maj. D. M. Lyon relinquishes his commn. and retains the rank of Maj.

TERRITORIAL ARMY.

Maj. E. H. Marshall resigns his commn. and is granted the rank of Lt.-Col. with permission to wear the prescribed uniform.

Glasgow University Contgt. (Medical Unit), Sen. Div.: Lt. D. M. Harper to be Capt.

ROYAL AIR FORCE.

Flight Lt. W. E. Hodgins (Capt., R.A.M.C.) is granted a permanent commission in the rank stated.

INDIAN MEDICAL SERVICE.

Maj. T. L. Bomford has been appointed Civil Surgeon of Howrah, vice Lt.-Col. D. P. Goil on leave. Lt.-Col. W. T. Furloyson, Inspector-General of Prisons, has been nominated a member of the Bombay Medical Council, vice Lt.-Col. W. Gillity resigned. Maj. C. C. Kelly acts as Civil Surgeon Panch Mahals, on the return from leave of Lt.-Col. E. F. G. Tucker; Lt.-Col. R. M. Carter acts as Presidency Surgeon, Second District, Bombay, with attached duties; and Maj. S. S. Vazifdar continues to act as Second Physician and Registrar, J.J. Hospital, and Professor of Materia Medica and Pharmacy, Grant Medical College, Bombay. Capt. J. M. Shah has been appointed Personal Assistant to the Surgeon-General with the Government of Bombay.

The King has approved the relinquishment of his temporary commission by Lieut. Sengara Pillai Ponniah, on account of ill-health, and is permitted to retain the rank of Lieut.

The King has approved the retirement of the following officers: Senior Assistant Surgeons with rank of Major: W. R. D'Sylva, R. A. Bœrmel, and J. F. Gibson.

DEATHS IN THE SERVICES.

The death is announced on Sept. 2nd at Aberdeen of Surg. Lt.-Col. John Murray, M.B., C.M. Aberd., J.P., Army Medical Staff, retired, in his eighty-second year. He was born on April 6th, 1843; qualifying in 1864 he became assistant surgeon Sept. 30th, 1864; surgeon March 1st, 1873; surgeon-major Sept. 30th, 1876; and retired with hon. rank (Hon. Brig.-Surg.) Dec. 10th, 1884. He resided in London at 12, Ashburn-gardens, S.W. His name was included in the Army List of Non-effective Officers in the war years.

The death occurred on Sept. 4th at Cheltenham, at the age of 91, of Surg.-Gen. Alexander Dudgeon Gulland, who qualified M.D. Edin. 1857, and L.R.C.S. Edin. 1854. He served at the siege of Sebastopol and the expedition to Kertch, in China in 1860, and in the Hazara campaign 1868. He was a friend of General C. G. Gordon ("Chinese Gordon," or "Gordon Pasha" of Khartoum).

Modern Technique in Treatment.

A Series of Special Articles, contributed by invitation, on the Treatment of Medical and Surgical Conditions.

LXXXVII.—TREATMENT OF RHEUMATISM OF CHILDHOOD.

Modes of Onset.

THE recognition of rheumatism in childhood at its very earliest stage is of such paramount importance in influencing treatment that a word must be said about the modes of onset of this extremely common and destructive disease. These may conveniently be divided into three groups: (1) Onset with acute symptoms; (2) onset with chorea; (3) insidious onset.

1. *Acute onset* is that familiar to those working in the medical wards of general hospitals. It usually takes the form of an acute febrile polyarthritis, which yields rapidly to treatment, but which is often followed by a varying degree of carditis; in this case the child continues to occupy for some weeks a bed or cot much needed for fresh admissions, but when the cardiac condition seems relatively stabilised, she is necessarily discharged. It is this form of the disease which, under the name of "acute rheumatism," has fostered the erroneous idea of the arthritis being a disease in itself, whereas, indeed, it is only, like acute pleurisy in tuberculosis, an acute symptom of a grave underlying constitutional infection.

2. *Onset with chorea* is also common. These cases commonly develop endocarditis at an early stage. At any time during the course of the chorea a heart lesion may (but does not always) develop, so that a long period of uncertainty as to the future is inevitable even in the most favourable cases.

3. *Insidious onset* is too often recognised only in the past tense. The symptoms are, indeed, numerous enough—"growing pains," sore-throat, headache (too often attributed to eye-strain), pallor, wasting, and languor—but none of these may make a sufficient appeal to the hard-worked mother of a large family, and often the child is only taken to hospital for shortness of breath due to advanced cardiac disease. Into this third group of cases there is a steady drift of children from the first and second groups, who, as a result of recrudescences of infection, become the subjects of a chronic rheumatic carditis, which at the worst destroys life in a few months or weeks and at the best is likely to lead to chronic cardiac insufficiency in later life. Occupying positions intermediate between these two extremes are thousands of cases, presenting all kinds of combined symptoms and signs of cardiac infection and insufficiency, the prognostic significance of which is the only key to proper treatment.

Treatment may conveniently be considered under the same three headings as have been used above—viz., treatment directed against (*a*) acute symptoms, (*b*) chorea, (*c*) chronic carditis, it being understood, however, that the third class of treatment applies to every case of rheumatism occurring in children.

Treatment of Acute Symptoms.

The arthritis and pyrexia in an acute case rapidly yield in young subjects to treatment by salicylates. Rheumatism is rare below the age of 6 years. To a child of 8 or 10 years, 15 gr. of sod. sal. may be given with 30 gr. of sod. bicarb. every other hour for eight hours, and thereafter four-hourly until the temperature becomes normal. After this the medicine must be continued thrice daily for at least a fortnight. In the meantime the child is kept in bed between blankets, and any affected joint is supported by cotton-wool and a small many-tailed bandage. In the case of a persistently painful joint, linseed poultices applied over a single painting with tincture

of iodine are useful. While any acute symptoms remain the diet should be strictly limited to milk and clear fluids, a milk diet being of great importance in the reduction and prevention of fever; meat extracts are not allowed. If tonsillitis is present the openings of the tonsillitic crypts must be repeatedly cleared by sponging with cotton-wool swabs; the mouth must be kept clean and the bowels opened daily. In the absence of all complications, rest in bed should be, if possible, continued for six weeks in all.

Chorea.—The treatment of chorea involves rest in bed and emotional restraint in all but a very few cases in which the neurotic element is so marked as to make early re-education of the first importance. The children should be encouraged to occupy themselves with sewing, knitting, or jig-saw puzzles for an hour or two every day, and a careful and discriminating nurse will know how to steer them between the varying emotions, dependent upon fatigue on the one hand and boredom on the other. Arsenic is of much use, given as Fowler's solution raised by ℥i. or ℥ii. week by week from an initial dose of ℥iv. t.d.s., until the choreic movements are in abeyance. The dose may then be continued unchanged for three weeks and then gradually lowered week by week until it is omitted altogether. Thereafter the child may start getting up, an added quarter of an hour every day being quite sufficient. During this stage, also, breathing exercises are most useful for the dissociated respiratory movements.

Prevention and Treatment of Rheumatic Carditis.

In the prophylaxis and treatment of rheumatic carditis is involved one of the chief outstanding problems of public health. Rheumatic disease stands in relation to tuberculosis of childhood, as regards frequency in about the relation of 2 to 3, but, in great contrast to tuberculosis, as yet no serious effort has been made to cope with what Dr. F. J. Poynton has rightly called a preventable disease, great destroyer of life though it is. Questions of importance in the general prevention of the disease include the improvement of housing conditions, the education of school authorities to recognise early symptoms, and the desirability of notification to enable cases to be followed up.

Management of the Individual Case.

1. *Tonsillectomy.*—Whenever it can reasonably be assumed that the tonsils may be a seat of rheumatic infection, tonsillectomy should be carried out. A fortnight's administration of salicylate of sodium thrice daily while the temperature is normal should precede operation. The evidence in favour of tonsillectomy is not yet conclusive, especially when chorea has been present, but on the whole it appears useful, especially if carried out after the first attack and before the heart is involved.

2. *Fresh Air.*—After tonsillectomy (and, in acute cases, after the completion of the treatment already described for these) a child who has had any form of rheumatic disease should be sent away from the environment in which it was contracted for from six to eight months, especially when the home is in a large town or a damp climate. This long convalescence should be insisted on whether complications in the shape of heart disease and chorea are present or not. Such a procedure often appears unreasonable to the parents, since the child seems to them and professes personally to be absolutely well. Nevertheless, it appears likely that when the allotted term of fresh air treatment is lowered beneath six to eight months, recrudescence is more than likely to occur, after the return home, in the rheumatic, just as in the tuberculous child.

3. *Rest.*—The ordinary convalescent homes, it is generally agreed, are not suited to deal with rheumatic cases. The life there is too active; rheumatic children should not be allowed to run about with those convalescent from such self-limiting diseases as pneumonia and whooping-cough. This means that accommodation should be found for them in some country home or ward where there is suitable nursing supervision. The number of available beds in this country is entirely inadequate for the thousands of children requiring them. Nevertheless, a few such places exist, of which the new heart home at Hartfield is the most recent.

As to the question of rest in bed, opinion is apparently still divided, though such authorities as Sir James Mackenzie and Dr. R. Hutchison recommend as much as six months' rest in bed while there is still evidence of infection in the heart. After observation of a number of cases during some length of time, I have come to the conclusion that the choice between rest in bed and progressive infection of the heart is in many cases unavoidable, and I have certainly never seen a child the worse for a long period of rest in bed. The children must be kept warm and should be out in the fresh air as much as possible; they should sit up in bed, since in that position the respiratory muscles act at greater advantage. Under such conditions the patients remain very contented and happy, provided that disappointment is not caused by foolish suggestions that "perhaps the doctor will let you get up this week," &c. Such suggestions, and the type of visitor who makes them, should be rigorously discouraged, since any emotional upset is very bad for rheumatic children. Treatment by rest in bed should be continued until three conditions are fulfilled: (1) The disappearance of anæmia. (2) The return of the pulse to normal, and the disappearance of the excitability characteristic of the rheumatic heart. In this connexion the return of the normal respiratory variations of the pulse is a sign of great assistance. (3) Stabilisation of the physical signs given by the heart. At this stage the borders of the heart assume fixed positions and, a sign of the greatest importance in mitral disease, the apical diastolic bruit, caused by obstruction to the smooth flow of blood over the mitral valve, ceases to vary its position in the cardiac cycle. These conditions fulfilled, the patient may be allowed gradually to get up, an added quarter of an hour being allowed daily so long as the physical signs remain constant. At the end of a month the patient will then be having an eight-hour day out of bed; but a long rest is always to be given in the middle of the day. At this stage respiratory and other physical exercises, suitably graduated, are of importance. During all this time the heart and pulse must be watched carefully. I have never seen the heart-rate do anything but rise at the commencement of getting up, though the contrary has been reported.

4. *Drugs.*—Salicylates should be given a good trial in every case where there is a recrudescence of pain or pyrexia, and will be successful in reducing these symptoms in all cases except those of advanced infective carditis. Should they fail, arsenic should be tried. The action of digitalis is uncertain, but a certain number of cases of persistent tachycardia undoubtedly respond to full doses of the tincture. In others there is no effect. Possibly the electrocardiograph may in the future differentiate more exactly the group of those cases among children who respond to digitalis from those who do not. Iron and hæmoglobin should be used during the long convalescent stage.

5. *After-care.*—The child having returned home at the end of six or eight months, regular and prolonged after-care is still necessary. When the heart has been damaged a place should be secured for the child at a school of the type that is provided by the London County Council for physically debilitated children. As a result of a long series of investigations, Dr. W. St. Lawrence, of New York, has come to the arresting conclusion that not until a given case has remained free from recrudescences for three years can its recovery be regarded as fairly safe.

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Public Health Services.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following table gives some of the principal statistics for 1923 of eight urban districts:—

Name of urban district.	Estimated mid-year population.	Birth-rate.	Death-rates per 1000 of the population.				Death-rates per 1000 births.		
			All causes.	Tuberculosis.	Cancer.	Resp. diseases with influenza.	Neonatal mortality.	Infant mortality.	Maternal mort. from childbirth.
Willesden ..	169,831	18·8	9·5	0·8	1·2	1·6	20	53	3·4
Tottenham ..	154,300	20·0	9·1	0·9	1·1	1·8	29	58	2·3
Ilford	89,020	18·8	9·5	0·7	1·3	1·2	21	41	2·5
Edmonton ..	69,590	22·2	9·5	1·3	1·1	1·3	28	55	1·3
Heston and Isleworth .	46,505	17·4	9·8	0·9	1·0	1·6	26	55	8·3
Barry	39,710	22·9	10·7	1·1	1·1	2·0	46	78	4·6
Spenborough .	31,520	15·9	13·4	1·0	1·4	3·0	40	96	10·0
Weston-super-Mare	25,320	12·8	12·4	0·9	1·4	1·5	9	46	6·2

Willesden.

Dr. George F. Buchan gives particulars as to the effect on the attendances at the maternity and child welfare and school clinics of the system of charges imposed by the Willesden Council. At the clinics for mothers and children under 5 years the total attendances for 1923 were 23,271, showing a fall of 4234 when compared with 1922. The table given shows a sudden drop in the attendances after the imposition of a registration fee for the clinics on Oct. 1st, 1921. The withdrawal of the registration fee for the school clinic on July 10th, 1922, is followed by a gradual recovery in the attendances. The registration fee for the maternity and child welfare clinic was withdrawn on Feb. 28th, 1923. A new scheme was put into force on April 1st, 1923, with the result that the attendances at the maternity and child welfare clinic are about half, and those at the school clinic about two-thirds of the attendances recorded in 1921. The report of the school dentist shows that only 21 per cent. of the dental defects followed up were treated, and the records indicate that a very small percentage of children receive treatment through hospitals and private dental practitioners. Dr. Buchan discusses the work of the special schools at some length. One of the needs is a better ambulance service for conveying the children to these special schools. At the Leinster-road school for mentally defective children training in some simple occupation requiring manual dexterity only during the last years of school life from 14 to 16 is needed. Cobbling, chair-caning, basket-weaving, and the mechanical part of simple tailoring are given as examples. The accommodation at the Furness-road school for physically defective children is unsatisfactory and would not be considered good for normal children. To some extent this unsatisfactory accommodation is balanced by the efforts of the Invalid Children's Aid Association in sending the children to convalescent homes at the seaside and in the country. The work of the Leopold-road school for physically defective children is interfered with by the lack of ambulance accommodation. Dr. Buchan also refers to the need for a local orthopædic clinic, and his remarks are endorsed by Dr. W. J. J. Stewart, the medical superintendent of the municipal hospital, who states that since the orthopædic work at the surgical out-patient clinic was discontinued there is no place near at hand where this treatment can be carried on. When the out-patient department was closed the number of children requiring orthopædic treatment was at its highest, and the expense of transporting these crippled children to the larger London hospital clinics is quite out of the question. Dr. Buchan points out that, in addition to the physically defective children who attend the two-day special schools, there are a further two hundred or so who should be provided for in an open-air day school. It is pointed out that the present staff of sanitary inspectors is insufficient to deal with housing repairs. The Council has endeavoured to find a simple method of enforcing the adequate maintenance of property without recourse to complicated legal procedure and have interviewed the Ministry of Health on the matter.

Tottenham.

Dr. David C. Kirkhope says that the housing difficulty remains a formidable proposition. As long as there is no surplus of houses, occupied houses cannot be brought up to a satisfactory standard of repair. Dr. Kirkhope expresses his astonishment that vital statistics continue so favourable under existing housing conditions, and thinks it not surprising that there is some scepticism in the minds of those who used to regard a satisfactory environment as the essential factor in the production of low death- and sickness-rates. An exhaustive report has been made on the pollution of the river Lee with a view to getting the County Council to deal with the matter. Two main sources of pollution have been discovered. The Milk and Dairies Amendment Act, 1922, which enables the Council to refuse to register purveyors of milk unless the premises are satisfactory, has been used with advantage. In several cases registration was withheld until requirements had been complied with, and in one instance a purveyor was struck off the register. Dr. Kirkhope points out that the antenatal clinic and district maternity home are not used as much as they might be, and expresses his opinion that every primiparous woman ought to seek the advantages that a maternity hospital offers. In his school report Dr. Kirkhope refers to the considerable number of small private schools in the district. These are mostly for young children and are generally conducted in the living rooms of private dwellings. In view of overcrowding, insufficient lavatory and w.c. accommodation, he thinks all these schools should be brought under the supervision of the local education authority. Arrangements have been made for the treatment of discharging ears by ionisation, and Dr. Kirkhope is in the happy position of being able to report that the clinics provided by the committee and the arrangements made with other authorities appear practically to cover every phase of medicine and surgery such as is necessary for the treatment of diseases of childhood.

Ilford.

Dr. A. H. G. Burton says the maternity home has proved its usefulness in spite of its not being entirely suitable for the purpose. He is, therefore, glad to report that the provision of a modern maternity home will be accomplished in the course of a few months. Dr. Burton states that an investigation into the "Milne" treatment of scarlet fever has shown that the method is an unsound one, and that the treatment (*a*) does not prevent "return" cases, (*b*) does not prevent the spread of infection to susceptible persons, and (*c*) does not prevent secondary complications. Dr. Burton states that the new milk orders have not met with any marked success, and thinks there will not be much improvement in the bacterial cleanliness of milk until a standard is fixed below which no milk must be retailed at all. As the result of a newspaper scare with regard to the retailing of tinned meats from army dumps, an inspection was made of grocers' stocks, but no justification was found for the scare in Ilford. Dr. Burton refers with satisfaction to the fact that 93 per cent. of the defects of vision detected among the school-children were remedied by the work of the ophthalmic surgeon, Mr. R. S. Charsley. The provision of an open-air school for Ilford is now under the consideration of the education committee. There is still no adequate provision for mentally defective children.

Edmonton.

Dr. H. W. Harding gives as the outstanding needs of his district: (1) more housing accommodation; (2) more travelling facilities; (3) a more hygienic method of disposing of house refuse than the present one of dumping; (4) a satisfactory method of treating the sewage. Dr. Harding states that there has been a set back in cleanliness in the schools, and associates this with the housing conditions. It is hoped to deal with the sewage problem during the present year. The recent circular from the Ministry with regard to cancer was discussed by the Edmonton Medical Society, which came to the conclusion that the local facilities for consultations, pathological examinations, treatment, and the transport of patients were satisfactory, that the public were being sufficiently educated in the matter by the press, &c., and that there was a feeling of nervous apprehension among the population that rendered special propaganda work undesirable. A mothercraft class has been started at the day nursery. Senior girls in groups of six attend one day per week for instruction from 9 to 10.45 A.M. for a period of six weeks. Sixty girls will pass through the class every term. The experiment has been a success and the girls are keenly interested in the work.

Heston and Isleworth.

Dr. Elwin H. T. Nash mentions an unusual incident in connexion with a well used by a dairyman for cooling purposes. The drawpipe of the well was eaten away and the water was acid. The cause of the trouble was found to be the effluent from some neighbouring works, which could not be discharged into the sewers on account of its acidity and colour, and was in consequence discharged into a deep soak-away in the gravel. The proprietors of the works provided the dairyman with a refrigerating plant and ultimately found a method for removing the colour and neutralising the acidity of their effluent. Under the heading of water-supply the health department have done useful work by securing the substitution of 108 taps direct from the main in lieu of water-supplies drawn from inaccessible and uncovered cisterns. Dr. Nash, in common with other medical officers of health of large urban districts, thinks the control of the midwives should be in the hands of the district council. Antenatal work has been hitherto negligible in amount owing to the lack of suitable premises. Negotiations for the latter are in progress. In the school report Dr. Nash gives some examples of satisfactory results obtained by persistent and persevering following-up. He refers to the unsatisfactory treatment of discharging ears and would like to see ionisation established. Dr. Nash points out that a large proportion of enlarged tonsils disappear after a septic mouth has been cleaned up, but, if operation is necessary, he is entirely opposed to slicing and favours complete enucleation. Only a small proportion of the children requiring dental treatment receive it. Dr. Nash would like to see orthodontic work established in the schools by coöperation between the school dentists and the consulting orthodontist at the hospital.

Barry.

Dr. Percy W. Kent says the present distressing housing conditions will exist until private enterprise is again available, although the council are doing their best to meet the demand for houses. Dr. Kent regards the maternity and child welfare work as the most important branch of the council's public health activities—even more important than remedying defects in school life. Dr. G. H. Winch, medical officer of the Glamorgan County V.D. Clinic at Barry, draws special attention to the regular attendance of patients, both male and female, in their evident keenness to be thoroughly treated and cured. Old-standing cases of syphilis and gonorrhœa still drop in for treatment and state that they have only just heard of the clinics. Dr. Winch concludes that there is even yet insufficient propaganda work. He further mentions the inadequate provision made for the treatment of seamen, especially in foreign ports. In the school report Dr. Kent mentions a new departure—namely, an Education Week, held in June. The programme included special excursions. The schools and school clinics were open for parents to see the work in progress. An illustrated guide was issued which included a brief history of the school service of Barry. The "week" proved a great success. Large numbers of persons attended and displayed a keen interest in the work of schools and clinics.

Spenborough.

Dr. Lawrence Pick shows that Spenborough, Halifax, and Keighley are the only districts in the West Riding where there are more males engaged in metal than in textile work. The census showed there were 2994 female and 1855 male textile workers, whilst there were 3145 male metal workers. In dealing with the work of the child welfare centres, Dr. Pick says there is a tendency for parents to regard them as hospital out-patient departments. Rather more dried milk was sold than in the previous year, but over 500 lb. less was supplied free. The council are negotiating for a site for a public abattoir. An inspection of the cowsheds shows that a considerable number have an air space of under 400 cubic feet per cow. Some of them are said to be in total darkness when the door is shut. During the year the Education Committee made satisfactory arrangements with neighbouring authorities for a dental service for the school-children and for the X ray treatment of ringworm. Cleanliness inspection among the school-children shows that about 4 per cent. of the parents are quite indifferent to verminous conditions in their children. The time is come, says Dr. Pick, when more vigorous action will have to be taken.

Weston-super-Mare.

Dr. John Wallace reports the satisfactory completion of the Banwell water scheme since the close of the year. The old water-supply was becoming increasingly hard and brackish. The provision of a pulverising plant has, it is hoped, satisfactorily provided for the disposal of refuse and done away with the need for tips. Suitable accommodation for the health department and a new infectious diseases hospital are among the outstanding needs. All the slaughtering is done at the public abattoir, and humane killers are used for cattle and pigs. The sanitary inspector points out, however, that a considerable amount of meat killed outside the town is brought into it.

SCHOOL MEDICAL WORK IN LONDON.

Sir William Hamer's report on school medical work in London during 1923 is good reading. Two hundred and eighteen thousand children obtained treatment. This figure has kept on growing in response to public demand, and will probably continue to grow until a high-water mark is reached, when preventive measures ought to make themselves felt and the flood of cases will subside. Dr. C. J. Thomas, who is responsible for this department, has good cause to congratulate himself on the efficiency of an administration dealing with the medical inspection of well over half a million children, and the medical treatment of 83 per cent. of those requiring it. Exactly 90·5 per cent. of children in need of spectacles obtained them; such a figure has never been touched before in any area and surely indicates a high level of efficiency and effort.

The work in London has gone ahead steadily. The greatest improvements have been shown in the direction of personal cleanliness and dental conditions. The percentage of elder girls with perfectly clean heads now stands at over 80. "Much of the work of the school nurses is educational, and a slow and steady improvement which is lasting and permanent in character is to be preferred to a more rapid improvement due to compulsion, which would prove evanescent when the compelling power was relaxed." The good work of the Council's dental centres is seen

in the progressive improvement in the dental condition of the 12-year old group. The number of children with four or more decayed teeth in this group has dwindled from 10 to less than 3 per cent., while of the junior scholarship candidates the number requiring dental treatment has fallen from 39 per cent. in 1913 to 7 per cent. to-day. Dr. E. O. Lewis's important investigation into the question of whether enlarged tonsils in children increase susceptibility to infectious disease, and whether susceptibility is decreased by removal of enlarged tonsils, showed the incidence of infectious disease amongst the school population generally to be 28 per cent., while upon those who had had enlarged tonsils removed it was only 4·8 per cent. On the other hand, Kaiser's[1] investigation into the effect of tonsillectomy on the general health of 1200 children in New York, as compared with an equal number of controls during the same period who were not operated on but in whom the indications for operation were the same, showed that the incidence of scarlet fever was not affected, though the severity of the attack may have been reduced.

The charts published appear to dispose effectively of a most interesting hypothetical connexion between the flea and scarlet fever; indeed, on the chart scarlet fever appears to increase as the activity of the Council's cleansing scheme disperses the flea.

That scarlet fever is a throat infection appears to be probable from the results of the Dick experiments and investigations in America, which are disclosing the possibility that an active immunisation of some sort will shortly be available. In this connexion it is interesting to note that not in one of the 230 cases in London certified as suffering from chorea was the disease a sequel of scarlet fever; indeed, Sir William Hamer considers that the relationship between chorea and rheumatism has been somewhat exaggerated in the past judging by the age distribution and the low incidence of cardiac disease among the so-called choreic cases. "The general features of the statistics support the conclusion suggested by the clinical examination of several cases, that there is an increasing tendency to certify as chorea conditions of purely neurogenic character. The substantial increase in the number of girls suffering from chorea is another proof that what hitherto was regarded as simply adolescent instability is now called chorea . . . that there is of late an increase of nervous trouble among children is shown by further analysis of the figures." From 1920 to 1923, 8·21, 7·8, 8·44, and 10·05 per cent. respectively of the out-of-school cases were absent owing to nervous trouble. In 1920 the proportion of out-of-school cases suffering from chorea was only 7·4 per cent., in 1921 it was 8·19 per cent., 9·2 per cent. in 1922, and in 1923 it was 9 per cent. Sir William Hamer considers that many of the cases of chorea would be more appropriately classified under nervous disorders, and puts forward a suggestion that the effect of air-raids on a child of 8 or younger might be the cause of the increase of nervous instability among the adolescent; it is quite possible that the nervous apprehension obtaining in most homes during the war is responsible for such a marked increase in those two sets of figures.

While the number of children from 3 to 5 years of age in the infants' departments of the elementary schools has increased to over 50,000, it is unfortunate that the number of nursery schools in London has remained the same. The Geddes report showed how inadequate was the provision for these children in the elementary schools. Dr. Margaret Hogarth, outlining the differences between the provision made for this group in the two types of school, sums up the fundamental difference in the fact that the amenities of the nursery school approach more nearly that of a middle-class home, but as far as main buildings are concerned, for summer and winter use, "few can be compared with the newer type of elementary school with French windows opening into a sunny playground, a large airy hall, and well warmed cloakroom where wet clothes and boots can be dried. . . The nursery school recognises that personal attention to the requirements of the child is just as important as attention to his mental requirements." There is no doubt that the inadequate provision for the physical and mental requirements of this age group is due to the fact that the teachers employed have had no special training to meet the case. The requirements of children from 2 to 5 years of age differ materially from those of older children, and the question of a proper training for their supervision is equally one for medical and educational consideration. A scheme for the special training of London County Council teachers in this work is needed and would not be difficult to formulate. It is to be hoped that London will see its way to tackle this really urgent question and to remove the unsightly gap which the absence of suitable medical and educational provision for children of 2 to 5 years of age undoubtedly leaves in the County Council's excellent scheme for child welfare and social progress.

[1] Journal of the American Medical Association, 1924, ii., 33.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED AUGUST 30TH, 1924.

Notifications.—The following cases of infectious disease were notified during the week, namely:—Small-pox, 54: scarlet fever, 1384; diphtheria, 595; enteric fever, 96; pneumonia, 383; puerperal fever, 37, cerebro-spinal fever, 10; acute poliomyelitis, 37: acute polio-encephalitis, 5: encephalitis lethargica, 55; continued fever, 1; dysentery, 9; ophthalmia neonatorum, 107. There were no cases of cholera, plague, or typhus fever notified during the week.

Deaths.—In the aggregate of great towns, including London, there were 6 deaths from enteric fever, none from small-pox, 9 from scarlet fever, 22 from diphtheria, 12 from measles, 20 from influenza. In London itself the diphtheria deaths numbered 8.

Special Articles.

NOTE ON THE DESTRUCTION OF RATS BY EXHAUST GAS.

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THE essentials of a satisfactory agent for the destruction of wild rats are that it should be highly lethal to rats, relatively innocuous to man, devoid of deleterious effects on cargo, furnishings, and fittings, and that it should be cheap and simple in application. The agents at present in use for this purpose—namely, sulphur dioxide, hydrogen cyanide[1] and carbon monoxide as generated by the Giemsa-Nocht apparatus—all fail in one or other of these essentials. We believe that the following experiments demonstrate that in the exhaust gases of the petrol engine we possess ready to our hand an agent which for the destruction of the wild rats comes nearer to the fulfilment of these requirements than any hitherto employed. The petrol used by us was either "Sphinx" or "Tydol," but other brands may doubtless give similar results.

Experiments with Motor-car Exhaust on Rats.

In a Box.—The gas was led from the exhaust pipe of an Overland car of 16–18 h.p., by a length of rubber tubing, through the lid of a box which measured 18 × 12 × 12 inches. Each rat used for experiment was introduced in a small cage into the end of the box remote from the inlet tube. The results are shown in Table I.

[1] Reports on Public Health and Medical Subjects, No. 19, 1923. Preliminary Report on the Use of Hydrogen Cyanide for Fumigation Purposes. By P. C. Stock, C.B., and G. W. Monier Williams.

TABLE I.—*Showing the Effects on Wild Rats of the Exhaust Gas in Box Experiments.*

Time.	*Mus rattus.*		*Mus norvegicus.*	
	Number used.	Result.	Number used.	Result.
5 minutes	1	Dead.	—	—
3 ,, ...	1	,,	—	—
2 ,, ...	—	—	4	Dead.
1 ,, ...	1	Dead.	1	,,
1 ,, ...	3	,,	2	,,
45 seconds	—	—	1	Collapsed.
30 ,, ...	2	1 dead, 1 collapsed	—	—

In these experiments all rats, brown or black, were killed by one minute's exposure to the gas.

For comparison the effects of sulphur dioxide from a hand-driven Clayton apparatus were tested. The optimum number of revolutions of the fan for this machine was ascertained to be about 50 per minute. Below and above this rate the lethal effect on wild rats fell away. In Table II. are given the results of using sulphur dioxide from the machine.

TABLE II.—*Showing the Effects of Sulphur Dioxide on Wild Rats in Box Experiments.*

Time.	*Mus rattus.*		*Mus norvegicus*	
	Number used.	Result.	Number used.	Result.
5 minutes	1	Dead.	—	—
3 ,, ...	1	,,	—	—
2 ,, ...	1	Alive.	2	Alive.
1 ,, ...	2	,,	3	,,

In these experiments no rat, brown or black, was killed by one minute's exposure to the sulphur dioxide gas.

In Drains.—A concrete drain was roofed in with planks and covered with earth. It was tested in lengths varying from 4 ft. to 81 ft. Rats were liberated into the drain at various points and the gas turned on; or, again, they were confined at each end of the drain or at chosen distance from the inlet end. The gases were tested both up hill and down hill. Contrary to expectation, the exhaust gas proved superior to Clayton gas even down hill in a steep drain 81 ft. long. Two black rats at the lower end of the drain were quite unaffected by 30 minutes' application of the Clayton machine to the upper end of the drain, whereas this exposure to exhaust gas killed such rats outright, and even 18 minutes' exposure caused collapse. *Mus norvegicus* was unaffected by 30 minutes' exposure to the Clayton, while the same period of the exhaust either killed or caused collapse. The introduction of exhaust gas into a drain did not drive the rats out, whereas the Clayton gas did so. Again, rats showed no reluctance to enter the drain when full of exhaust gas; they declined to enter when it was full of sulphur dioxide.

The fact that rats tend to try to escape from the sulphur dioxide fumes indicates that in warehouses and ships undergoing fumigation they would make for a more respirable atmosphere. As sulphur dioxide is very slow in its effects they have ample time to seek out the least poisonous areas. This, taken in conjunction with the difficulty of applying sulphur dioxide equally to all parts of a ship, helps to explain the frequency with which wild rats survive such fumigation.

In a Sealed Chamber.—A room constructed of concrete was used, the windows being sealed with brown paper having inspection windows inset. The rats were distributed in cages on the floor, near the ceiling, and at the inspection windows. The door was sealed and the gas introduced through a circular aperture cut to fit the delivery tube. The capacity of the chamber was 2160 cubic feet. Several experiments were carried out with each gas.

Exhaust gas was applied to the chamber for half an hour; at the end of that time, on opening up, of eight rats used five were dead and three collapsed. The gas was next applied for one hour; at the end of this experiment all the rats used, five in number, were dead.

Sulphur dioxide was applied to the chamber for half an hour with the fan rotating at 50 revs. p.m.; at the end of that time, on opening up, of eight rats used, four black and four brown, none were dead. Applied for half an hour at 50 revs. p.m., followed by six hours under seal, the gas killed only two out of eight rats. Applied for half an hour at 100 revs. p.m., followed by six hours under seal, the gas killed none of eight rats exposed, four black and four brown. The unsatisfactory results obtained from the Clayton apparatus led us to discard it and use sulphur candles for future comparisons.

By making use of the inspection windows the different effects of the two gases on the rats could be studied and timed. It was seen that rats exposed to the exhaust gas showed no sign of any disturbance up to a period of 15 minutes; this was the earliest time at which the effects began, the latest being 25 minutes. The first effect noted was restlessness; the rat suddenly began to run about anxiously; in a minute or so it collapsed, took a few deep gasps, and died. Rats removed from the gas atmosphere immediately after collapsing on the bottom of the cage recovered with great regularity, but if not immediately removed they invariably died without further struggle. With sulphur dioxide as administered by the Clayton hand machine the rats showed slight lacrymation and respiratory effects; with the candles burning they began after half an hour to lacrymate and cough. They moved about anxiously, then huddled themselves up in a corner; soon they moved about again, becoming more and more disturbed in their respiration. The action of the gas was productive of great distress, and yet was very slow in its ultimate effect. Even with six candles burning, which is much in excess of the number stated to be requisite, it required three hours to produce the death of wild rats. The animals' eyes were then covered by an opaque film, and the animals were much contorted. All the evidence from these experiments shows that in exhaust gas from a petrol engine we have an agent which is extremely lethal to rats, which is rapid in its action, and which kills with the minimum of suffering.

Experiments with Motor Launch Exhaust on Rats.

In Box.—The exhaust here was only obtainable mixed with the cooling water of a 10 h.p. engine; the gas and water were discharged through the same pipe. Preliminary experiments proved that with the water turned off the exhaust gas was fatal in one minute. There was some blackening from the carbon when so used. It was found that by allowing the water to issue with the exhaust gas the lethal effect of the gas was not impaired, and the gas was clean and produced no blackening effect.

In Ship's Lighters.—An empty lighter was used for the next experiment. This had a watertight hold of 2304 cubic feet capacity. It was the usual type of lighter used for loading at Freetown, with tightly fitting hatches and tarpaulins battened down. The experimental cages were distributed high and low in it, and the exhaust gas with water passed in a tube under one of the hatches supported on a wedge, the tarpaulin being drawn tightly round it; the gas entered the hold at three-quarters of its depth. Six rats, three black and three brown, each in a separate cage were used. The engine of the launch was run for an hour and the hatches opened. The gas rapidly escaped in an easily visible cloud, and all the rats were found to be dead. After the experiment had been going on for 35 minutes a rat was lowered into the hold for five minutes; when removed it was collapsed on the bottom of the cage but still breathing slowly, and it recovered. It is clear that even so early as this the concentration of the gas in the empty lighter was almost sufficiently high to have a lethal effect.

The lighter was then loaded up with palm kernels in hessian bags and the hatches put in position; one hatch at each end was then lifted and 12 rats were admitted free to the hold, eight in the far end and four in the near end. The hatches were replaced, covered with the tarpaulins, and battened down. Exhaust gas was run in under one hatch for an hour. The hatches were raised, and after the lapse of less than ten minutes the cargo was removed. Of the 12 rats liberated all were found; ten were dead and two collapsed; these recovered later.

These experiments show that rats free even in a loaded lighter are rarely capable of escaping from the lethal action of the gas by sheltering in crevices between the cargo. It appears probable that a slightly longer exposure would have killed 100 per cent. of the rats. Considering that the whole operation in this experiment from the time of commencing fumigation to the time when the labourers started

handling the cargo after opening up only occupied an hour and ten minutes, it appears a very promising method.

A local firm supplied us with a representative series of articles of export and import; these were exposed to the exhaust gases for six and a half hours. The results showed that the gases had no ill-effect on such articles of food as lard, butter, sugar, cocoa-beans, potatoes, flour, bacon, salt, ground nuts, palm kernels, palm oil, onions, and other commodities. No deleterious effect was observed, in texture or in colour, on a large range of cotton, silk, and woollen articles also exposed for six and a half hours to the gas.

Experiments to Test the Penetrating Power of the Exhaust Gas.

These experiments were designed to show whether the gas could gain access to rats concealed in bales and in packing cases and cupboards on board ship or in store sheds.

Rats enclosed in one or in many folds of hessian bags were invariably found dead after one minute's treatment in the experimental box. Similarly rats enclosed in a cardboard box provided only with a slit-like aperture too small for the rats to escape from were killed in one minute. Sugar, flour, ground nuts, salt, rice, bacon, and many other articles are packed in hessian bags. It is clear, then, that this gas possesses great power of penetration, and that rats are not protected from it by any of the ordinary packing methods used.

Effects on Human Beings.

During the whole of the experiments no ill-effect on man was ever observed, although many uneducated natives were employed, and of necessity were somewhat exposed to the gas. The gas which had diffused so thoroughly in one hour as to kill all the rats in the empty lighter and 10 out of 12 in the loaded lighter cleared rapidly when the hatches were removed. When the visible cloud had disappeared from the hold men were able to enter it with safety.

We have unfortunately not had an opportunity of testing the method in large ships, but there seems no reason to suppose that it is not applicable to them. It could be applied by dividing the ship into sections and using several motor launches simultaneously. Indicator rats should in all fumigation work be laid down in remote parts of the place to be treated, and used as tests at opening up before entry.

Summary and Conclusions.

1. The exhaust gas of the petrol engine of a motor-car or launch is very fatal to wild rats, black or brown.

2. It is relatively safe for human beings to work with.

3. It does not damage cargo, fittings, or furnishings.

4. Its use involves no apparatus which is not universally obtainable in any port; it is cheap, easy of application, and rapid in its action.

5. It clears quickly on opening up after application and leaves no unpleasant odour behind.

Acknowledgments are due to Mr. L. White, Messrs. Elder Dempster and Co., Ltd., for placing a launch and lighter at our disposal, and to Captain Pirie and Mr. Henning for much assistance in arranging the details of the experiments. We are also indebted to Messrs. Forbes-Gatherum and McAlister, of the African and Eastern Trade Corporation, Ltd., who kindly undertook to furnish us with samples of produce and goods for testing, and who reported on the effects of the gas on the articles after the tests.

MEDICAL CERTIFICATION OF CAUSE OF DEATH.

ISSUE OF A NEW FORM.

IT is exactly 50 years since the Births and Deaths Registration Act of 1874 came into force, and with it the present form of Medical Certificate of the Cause of Death. This form relieved the practitioner from the obligation to certify, as of his own knowledge, the age of the deceased, and no longer required the practitioner to certify the fact of death. The revision of the form of medical certificate has now been taken a little further, chiefly for the purpose of removing certain ambiguities which in practice were found to attach to the old form. A new form has been drafted and will shortly be issued which, while requiring no more information than the old, provides for that information being stated in a more direct and unambiguous manner.

In reference to the form of the statement indicating whether the fact of death is certified by the medical practitioner on his own knowledge or merely reported on the information of the relatives, in the old form this statement and the statement as to the date of death are combined in words running as follows:—

"(I hereby Certify) . . . .; that he died ..... on the ..... day of ..... 19....";

while a note to the asterisk states: "Should the Medical Attendant not feel justified in taking upon himself the responsibility of certifying the *fact* of Death, he may here insert the words '*as I am informed.*'"

In the first place, this arrangement places upon the certifying practitioner the duty of writing in the words "as I am informed" in what must be the great majority of certificates given; and it is clear from the certificates received by the Registrar-General that these important words are frequently omitted when they should have been inserted. In the second place, by the linking together of the fact and the date of death, a difficulty is created by reason of the fact that the source of information may not be the same in both cases. The practitioner might have seen the deceased after death and might thus feel justified in omitting the words "as I am informed"; but his personal knowledge need not have extended to the date of death as to which he might have been obliged to accept the statement of the relatives.

In the new form the two statements are separated and the opportunity is given to the certifying practitioner of indicating very simply whether he certifies from his own knowledge or merely reports the statement made to him by striking out one of the alternatives in each pair.

In the old form there were four instances in which the print had to be adapted so as to suit the sex of the deceased (his, her; him, her; he, she). These have been reduced to one; while the removal of the requirement as to the insertion of words and the general straightforwardness of the new form should, it is thought, make it distinctly easier for the certifying practitioner to complete. By the courtesy of the Registrar-General we print on the opposite page the exact text of the new form of certificate, underneath the old form in order to facilitate a comparison.

The remaining small supplies of the old forms in the hands of registrars or of medical practitioners are, we understand, not being withdrawn, so that the new form of certificate will only come into general use as the residual supplies are exhausted.

OLD FORM.

X 17736

N.B.—THE PERSON TO WHOM THIS CERTIFICATE IS ISSUED MUST DELIVER IT, WITHOUT DELAY, TO THE REGISTRAR OF THE SUB-DISTRICT IN WHICH THE DEATH TOOK PLACE.
THE USE OF THE CERTIFICATE FOR OTHER PURPOSES IS A PENAL OFFENCE.

BIRTHS AND DEATHS REGISTRATION ACT, 1874.

MEDICAL CERTIFICATE OF THE CAUSE OF DEATH.

No. of corresponding Entry in Register Book of Deaths to be inserted here by the Registrar.

For use only by a Registered Medical Practitioner who has been in attendance on the deceased person, and to be given to some person qualified to be an informant for the Registration of the Death (*see over*).

I HEREBY CERTIFY *that I attended* John Robinson *during h* is *last illness; that such Person's age was stated to be* 21 years *; that I last saw h* im *alive on the* 17th *day of* February 192 1 *; that he Died** as I am informed *on the* 18th *day of* February 192 1 *; at* 7, King Street, Marylebone *and that to the best of my knowledge and belief the Cause of h* is *death was as hereunder written.*

* Should the Medical Attendant not feel justified in taking upon himself the responsibility of certifying the fact of Death, he may here insert the words "*as I am informed.*"
† *i.e.*, the disease which initiated the train of events leading to death, and *not* a mere secondary, contributory, or immediate cause, or a terminal condition or mode of death.
As to deaths from violence *see* par. (e) page ii.
‡ A terminal condition or mode of death should not be entered as a secondary (or contributory) cause.

CAUSE OF DEATH.	Post Mortem Yes or No.	Duration of Disease from onset. Years.	Calendar Months.	Days.	Hours.
Primary† (1.) Enteric Fever				21	
Secondary‡ (2.) Broncho-Pneumonia (Contributory)	No			3	

[The informant should read the "P.B." at the head of this Form and also the instructions on the back.]

Witness my hand, this 19th *day of* February 19 21.

Signature Edward Lawrence
Qualifications as registered by Medical Council L.R.C.P. Lond.
Residence 37, Soho Square, W.1

THIS CERTIFICATE MUST NOT BE USED FOR BURIAL PURPOSES.

NEW FORM.

Y 1

N.B.—THE PERSON TO WHOM THIS CERTIFICATE IS ISSUED MUST DELIVER IT, WITHOUT DELAY, TO THE REGISTRAR OF BIRTHS AND DEATHS OF THE SUB-DISTRICT IN WHICH THE DEATH TOOK PLACE.
SEE INSTRUCTIONS ON THE BACK.

BIRTHS AND DEATHS REGISTRATION ACT, 1874.

MEDICAL CERTIFICATE OF THE CAUSE OF DEATH.

No. of corresponding Entry in Register Book of Deaths to be inserted here by the Registrar.

For use only by a Registered Medical Practitioner who has been in attendance during the deceased's last illness, and to be given to some person qualified to be an informant for the Registration of the Death (*see over*).

John Robinson *deceased.*

I hereby certify that I attended the above-named deceased during h is *last illness.*

*I certify** / *I am informed** *that the deceased died on* 17th *day of* February 19 24 *at* 7, King Street, Marylebone. *I certify that I last saw the deceased alive on* 16th *day of* February, 19 24 *; that I have* not seen* / seen* *the deceased since death; that deceased's age was stated to be* 21 *and that to the best of my knowledge and belief the Cause of death was as hereunder written.*

* Strike out if inapplicable.
† *i.e.*, the disease which initiated the train of events leading to death, and *not* a mere secondary, contributory, or immediate cause, or a terminal condition or mode of death.
As to deaths from violence, *see* par. (e), page ii.
‡ A terminal condition or mode of death should not be entered as a secondary (or contributory) cause.

CAUSE OF DEATH.	Post Mortem Yes or No.	Duration of Disease from onset.*
Primary† (1.) Enteric Fever	No	21 days
Secondary‡ (2.) Broncho-Pneumonia (Contributory)		3 days

* State duration in hours, days, calendar months, or years, as the case may be.

Witness my hand, this 19th *day of* February 19 24.

Signature Edward Laurence
Qualifications as registered by Medical Council M.R.C.S., L.R.C.P. Lond.
Residence 37, Soho Square, W.1.

THIS CERTIFICATE MUST NOT BE USED FOR BURIAL OR INSURANCE PURPOSES.

BRITISH MEDICAL ASSOCIATION.

ANNUAL MEETING AT BRADFORD.

(*Continued from p. 516.*)

SECTION OF MEDICAL SOCIOLOGY.

FRIDAY, JULY 25TH.

Has the National Health Insurance Justified its Existence?

THE whole of two sessions, morning and afternoon, were given up to the consideration of the answer to this question and the speakers approached the matter from every point of view. The President, Dr. ARTHUR MANKNELL (Bradford), introduced the subject by a judicial summary of the various headings involved in a complete answer of the question, without expressing his own opinion.

Representative Opinions.

Sir W. S. GLYN-JONES spoke for the insurance committees. He considered that the system had justified itself, but was far from fulfilling the promises made for it in Parliament when it was established. Whilst to the individual the goods had been delivered, the State was still waiting to receive what it had paid for. The preventive features of the Act had been a dead letter, and the National Health Insurance system would not be fully justified until all taking part in it coördinated their efforts in tackling what Sir George Newman described as "perhaps the main part of the health problem of the nation." You could not convert a grudging or incompetent doctor into a keen, tactful, competent practitioner by means of regulations. Too much importance had been attached to paper controls. His recipe would be to provide such conditions of, and remuneration for, medical treatment as would result in practitioners being as anxious to secure and to retain insurance patients as they were to secure and retain private patients. If, in addition, the insured person were educated to recognise efficient treatment, then with the free choice of doctor the rest could be left to the ordinary laws of supply and demand. Now that the profession and the Government were to have a rest from bartering there was some hope that both would take "a long view" and soon be engaged in administering a service of which both would be proud.

Alderman FRANCIS ASKEW, J.P. (Hull), spoke for the approved societies. In 1911 the voluntary members of friendly societies numbered 5,000,000. The Act brought into compulsory insurance 15,000,000 persons. The actuarial advice tendered to the authors of the Act had worked out fairly well, including the experiment dealing with the introduction of women workers. Imperfect as the Act and its administration might be in some respects, the insured population would never vote for its repeal.

Mr. TOM HARLAND (Bradford), speaking for male insured persons, thought the time would come when dental and optical treatment, convalescent home, and hospital treatment would be definite supplementary benefits for everyone insured. Some societies already gave these benefits. Some doctors gave of their very best in skill and attention, but some gave it rather grudgingly as if they were not well enough paid. He thought the funds of the societies suffered from careless certification. Furthermore, doctors with overcrowded panels should get more assistance in order to avoid long waiting queues. He suggested that all insured persons should be medically examined, say, every five years. [A similar suggestion was made by Dr. Peter Macdonald two days before.] Most insured persons did not visit their doctor early enough.

Miss FLORENCE GODFREY (Birstall), speaking for female insured persons, was glad to think that the majority of insured women, of whom all sorts of terrible things were predicted, did the right thing and only applied for benefit when it was needed. The Act needed amending as regards married women and pregnancy. Some women got doctors' certificates and received sick pay during the whole of pregnancy, although doing their household work, while others received nothing but their maternity benefit. Many women were not satisfied with the panel system and said they did not receive as good treatment as did private patients. The complaint was sometimes made that it took the doctor only as many minutes as there were panel patients to give them attention, and in such a case the most ignorant of them knew they were not receiving the treatment they had the right to expect. The regulations as to emergency calls were too stringent. The main special benefit of her society was convalescent benefit and it was of great value. She thought the Act had justified its existence, and, if rightly and sympathetically amended, would do so still more in the future.

Dr. A. E. BARNES (lecturer on medicine, University of Sheffield) said he could not speak for consultants as a class, but he had been intimately acquainted with the working of the Act since its conception. He considered that the Act had been one of the greatest advances in administrative medicine in our time. It had brought organisation into what had been chaos. It was a revolution which by means of evolution would eventually become the most important factor in public health. He considered that the panel committees had great opportunities, and in several instances they had shown their interest in research work. The service given by the panel practitioner had improved, and young men were going into the service with avidity. Three of the points for criticism were the prominence given to the bottle of medicine, the increase of neurotic illness, and the lack of a consultant service. He thought these matters could be dealt with by the substitution of a medical treatment fund for the present drug fund, so that the doctor who wished to have consultations, special appliances, or laboratory help could obtain them out of the fund by economising in the doling out of unnecessary medicines.

Dr. G. B. HILLMAN (Wakefield) voiced the views of the general practitioner. He enumerated the essentials of a satisfactory medical service. He thought the institution of panel committees had promoted a more cordial and brotherly feeling among practitioners. In his opinion the Act had led doctors to take a wider view of their duties in the direction of preventive medicine. The old pathetic belief in the bottle of medicine was slowly passing away, and more faith was arising in modern methods of examination and greater appreciation of the progressive practice of medicine. Amongst other instances of progressive action on the part of panel committees he mentioned the West Riding scheme for laboratory facilities and the establishment of a prize in clinical medicine at Leeds University.

Mr. H. S. SOUTTAR (surgeon, London Hospital), speaking on behalf of the voluntary hospitals, said there were misgivings when the Act came into force as to its possible effect on the income of the hospitals and the number of their patients. At the London hospitals they found that the number of out-patients had diminished. Practically speaking, out-patients were only seen on a letter from the panel practitioner to whom an answer was sent in due course. The figures showed that the hospital was not being swamped by patients who ought to be treated by their panel doctor, and that in the second place the serious cases sorted out by the panel practitioners were able to receive more careful attention. If in the future the scope of the Act was enlarged so as to extend its operation to dependents and to include hospital treatment among the benefits, hospitals would be still further relieved of minor cases and the consultative value of their services increased. Interchange of information between the consultant and the general practitioner would become a matter of routine; the early reference and admission of serious cases would be assured; and along these lines there would be developed a great health service strong in the fight against disease and in the interests of the country.

Mr. J. J. BARRON (secretary-superintendent, Bradford Royal Infirmary), speaking for the administrative side of the voluntary hospitals, said that since the establishment of the Act at the Bradford Royal Infirmary there had been, as in the case of the London Hospital, a decline in the number of out-patients but a considerable increase in the number of in-patients. As the main items of hospital expenditure are incurred in the in-patient department, he thought the hospitals might fairly ask from the approved societies and the insurance committees the costs to which they were put in dealing with insured in-patients.

Dr. J. J. BUCHAN (M.O.H., Bradford) thought the National Health Insurance Act had justified its existence from the point of view of preventive medicine. Panel practitioners were now directly interested in the environment of their patients, and since the passing of the Act he had received more reports from medical practitioners with regard to bad environment. By the passing of the Act 16,000,000 people had been encouraged to regard illness in all its stages as worthy of consideration and to seek medical treatment at the onset, when it was more likely to be effective. Most insurance committees had done something in the direct education of the public in health matters. Special efforts had been made against certain diseases—e.g., tuberculosis. Lastly, medical benefit had been a great effort to ameliorate disease among the sufferers and to mitigate its after-effects. During the first ten years, owing to the encouragement of a greater care of the sick, there might be an apparent tendency towards increased sickness, but over a longer period we should find a marked decrease, and with this decrease a greater efficiency of each unit in industry.

Discussion.

Dr. HAROLD BEADLES (West Ham), speaking as chairman of an insurance committee, said the scope of the Act must be widened by the inclusion of dependents and persons who at present came under the Poor-law. He would like to see the work put under committees of the county councils and county boroughs and the same benefits arranged for sickness, accidents, unemployment, old age, &c., all on a contributory basis. We spent £280,000,000 per annum at present on social schemes, and he did not think a comprehensive insurance scheme such as he had mentioned would increase the cost.

Dr. J. F. WALKER (Southend-on-Sea) said there was still a suggestion of slight about the term "panel doctor." The medical service subcommittee was not quite satisfactory. He thought a panel medical court of honour would be more effective. The delay in granting sickness benefit frequently gave rise to criticism. It was often necessary to give a bottle of physic in order to get other advice acted upon.

Dr. HERBERT JONES (M.O.H., Herefordshire) thought panel practitioners might call in the medical officer of health more than they did. He found it a great advantage himself to be on the panel committee for the county.

Dr. G. W. SKENE (Willesden) said that general practitioners were not unanimous in supporting the panel system. The reason was not financial but arose from irritating features of administration. The whole of the profession ought to be brought in if possible.

Mr. W. GILL, J.P. (Manchester Unity of Oddfellows), said the approved societies as well as the doctors had to put up with administrative irritants. A medical service subcommittee composed of doctors would not answer. It must be two-sided. Insurance committees had lost the most interesting part of their work in tuberculosis. It would be a mistake and dehumanising to transfer the work of insurance committees to county and borough councils.

Dr. PETER MACDONALD (chairman, York Insurance Committee) said medical men were dead against the Act in 1912, but now, in the words of Dr. Stancomb, "it would take a high explosive to blast them out of it." Speaking as a member of an insurance committee, he believed that the panel practitioners mostly did their work well. Contract work had given a value to preventive work by the general practitioner.

Dr. G. H. SEDGWICK (Rotherham) said that if the Act were to justify itself it must be made complete. Every general practitioner must be got on to the panel and the invidious distinction between the "family" doctor and the "servants'" doctor done away with.

Dr. J. W. BONE (Luton) thought those who gave the service were as a rule satisfied. In some places like Bournemouth fees were too high to make panel practice worth while. He did not think insured persons were quite satisfied. The friendly societies' institutes did not have free choice of doctor. Insured persons did not like the double wait at the doctor's and the chemist's. The delay in giving sick pay also caused dissatisfaction. Some agents of friendly societies sometimes made difficulties in order to persuade persons to join their particular societies.

Dr. C. BUTTAR (London) said they should get rid of lay control. Medical benefit should be separated from sickness benefit and put under the Ministry of Health. Discipline should be entrusted to committees of the medical profession.

Mr. C. J. BOND (Leicester) said the Insurance Act was a great step forward. In contrast with the London Hospital and Bradford Infirmary out-patients at Leicester were now nearly pre-war in numbers. Fifty thousand patients were now waiting for beds in the county and an increased hospital service was greatly needed.

Dr. E. W. G. MASTERMAN (medical superintendent, Camberwell Infirmary) said the London Poor-law hospitals treated more patients than the London voluntary hospitals and that 95 per cent. of their patients were sent in by panel practitioners. They had no waiting list and never refused a patient. The Poor-law hospitals must be linked up with the general medical service.

A Summing Up.

Dr. H. B. BRACKENBURY (London) endeavoured to sum up the discussion. He thought the figures for out-patients in Leicester were exceptional and that the figures for the London Hospital and Bradford Infirmary were the rule, indicating that panel practitioners were not shuffling off their patients on to the hospitals. Panel practitioners were evidently contributing to preventive medicine by drawing attention to environment when it was bad. The insurance system was agreed to have justified itself by all the speakers. It was an encouragement of thrift, and all the speakers included its extension in their programme. He agreed that medical benefit should become part of the enlarged health service of the country, and should be separated from the cash benefit. It was not clear why all general practitioners did not go on the panel. He did not think disciplinary control could be handed over to the doctors, although ideally it might be better to do so. Professional honour was a better guide than regulations. A great extension in the insured population was needed by the inclusion of 30 millions of dependents. He was not afraid of the profession becoming commercialised by the payment of the present honorary staff of hospitals. Insurance committees cannot deal with public health matters on behalf of a section of the population only, and when the insured population was extended the work of the insurance committees would need to be transferred, but their clerks and officials would still be required. Compulsory physical examination of insured persons at stated intervals could not be enforced, and he doubted if voluntary examination would be much use. He believed that loose and imperfect certification by panel practitioners was quite rare and that the difficulties of exact certification were not understood by the layman. In order to provide for thorough medical work with a due regard for the preventive aspect it might be a good plan to increase the capitation fee.

A FORECAST OF THE MOTOR SHOW.

IMPROVEMENTS IN 1925 MODELS.

BY J. MARSHALL, M.I.A.E.,

LONDON MANAGER OF MESSRS. MANN, EGERTON AND CO., LTD.; OFFICIAL CONSULTING ENGINEER, MEDICAL INSURANCE AGENCY.

THE motor show opens at Olympia on Oct. 15th. Since the popularisation of motoring this annual exhibition of new models and accessories has become a function of importance to all classes of the public, and there is reason to anticipate an even larger attendance than last year. Certain innovations which have proved successful on a few 1924 cars have now been much more generally adopted; actual reductions in price are not to be looked for in many cases, but since certain accessories, formerly costly extras, are now included as standard equipment, the 1925 cars complete for the road will be a better proposition than were the 1924 models.

Outstanding Features.

Balloon tyres, four-wheel brakes, and cars completely equipped with accessories are likely to be the outstanding features of the show, and the advantages of their adoption are worth consideration.

Balloon tyres mean easy riding over rough roads, with consequent elimination of severe shocks on the chassis. If tyres have to be changed they are much easier to put on than the ordinary type, and certainly less laborious to pump. Side-slips are, to a certain extent, minimised. It is, of course, quite possible for cars fitted with ordinary type tyres to be converted to low pressure ones at a cost varying from £15 upwards, according to size. It is important to remember that the whole secret of the successful use of balloon tyres lies in maintaining the pressure exactly as specified by the tyre manufacturers, and for this purpose a simple and inexpensive gauge, of the type shown in Fig. 1, should be carried by every motorist for periodical testing.

FIG. 1.—Tyre pressure gauge.

Four-wheel Brakes.—These will be standardised on many cars or can be fitted at an extra cost varying from £10 to £50. These brakes should be of great benefit to doctors whose journeys are confined largely to highly polished tarred roads or setts, where risks of skidding are great. With four-wheel brakes it is not easy to make a car side-slip, and when used for the first time a comfortable sense of security is experienced.

Accessories.—Such accessories as a petrol gauge, windscreen wiper, or driving mirror can be looked for as standard equipment on most cars.

Considerations of Price.

Reductions in prices of medium and higher priced cars can hardly be anticipated, principally because these prices were more or less stabilised when the McKenna duties were taken off on August 1st. The majority of makers of smaller or lower priced cars have issued their new prices, and these show certain reductions. There is a strong possibility of continental and American prices being raised in the near future; in fact, one or two American makers have already decided on this step.

The broad question as to whether to buy an expensive car designed to last some years, or an inexpensive one to be replaced after, say, two years, is a point that can only be decided in relation to a doctor's special circumstances. Obviously, in a better-class practice it is desirable to run a better-class car, which cannot economically be disposed of until it has given five to eight years' use. In no case is it wise to contemplate exchanging a car until it has run approximately 15,000 miles. We are frequently asked whether, when the purchase of a new model being contemplated, negotiations as to the disposal or exchange of a second-hand car should be hurried on before the show. This is quite unnecessary, since between now and October values in second-hand cars are unlikely to change.

Fashions in Bodies.

Owing to the great advance made during the past year in all-weather equipment for touring cars, the coach-built all-weather type of body is becoming less popular. This is hardly surprising, since the old type of coach-built all-weather body with wooden pillars is a constant source of trouble. Its liability to rattle

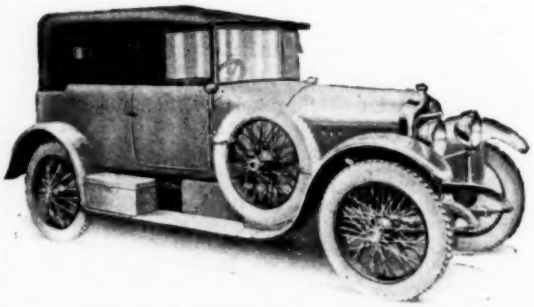

FIG. 2.—A cabriolet with a "Gwynne" head.

and the expense of keeping in good condition has been much complained of. The "Gwynne" or "All Steel" type of cabriolet is likely to remain popular. It is considerably more expensive than a touring body, but it offers the advantages of an open touring car combined with those of a completely enclosed one with glass windows. In contrast with the coach-built type, there are no rattles, and its lasting qualities are good. The appearance of both types of cabriolet body is shown in Figs. 2 and 3. However, the types of car most likely to be in demand this year are: (*a*) the saloon with and without partition, and (*b*) the touring car with first-class all-weather equipment. If this equipment is made on up-to-date lines and by a good coach-builder it is practically wind and waterproof, and has the advantage of being put up and down in two or three minutes. Another type of car very

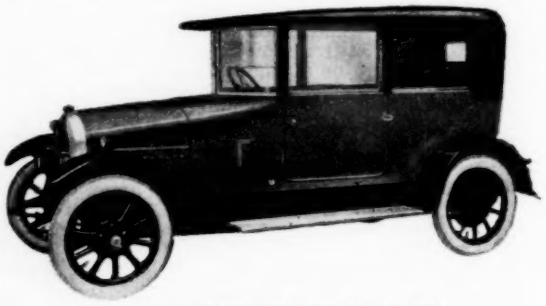

FIG. 3.—A cabriolet with a coach-built head.

useful for professional purposes only is the two-seater coupé with dickey.

The so-called "Chummy" (or "occasional four-seater") bodies seem to be less popular, since the rear seats of this type of body are extremely uncomfortable, and the two-seater with dickey is returning to favour. Although the occupants of the back seat are not under cover, this disadvantage is more than counterbalanced by the extra comfort obtained when it is not raining.

New Fabrics for Body Work.

Many small or medium powered cars will have bodies panelled with fabric leather in place of metal or plywood panels. This type is commonly called the "Weymann," after its original inventor. It has many advantages over the ordinary body, in that it can be made very light, has no creaking joints or drumming,

and paintwork can be entirely dispensed with. It has been found quite durable, and in the event of an accident, easily renewable. To clean these bodies it is only necessary to sponge them over and dry off. Recently new developments of this idea have come to the front, one of which is termed the "Jazz" (see Fig. 4). The body is first covered with fabric and this is afterwards treated with coats of celluloid and varnish, the result being a durable and unusual finish not easily scratched. Fabric can be used with intricate or elaborate patterns in colour, according to the taste of the owner. The new process is slightly less costly than

FIG. 4.—A "jazz" finish celluloid and varnish over fabric.

good paintwork and does not crack or blister. Bodies which have been treated in this way and have been on the road for nearly a year show small signs of wear.

How to Look at the Show.

As a result of many years' experience of the shows I have come to the conclusion that it is quite futile for one with a "will to purchase," and not much time to spare, to go to the show with the idea of looking round generally and coming to some decision. He may study many different makes, and each one as he goes on seems to present something better than those he has previously seen; until at the end of one or two days he is hopelessly befogged. It is much better to study quietly the makers' descriptions of a few cars in which he may be interested, and go with the object of seeing these and decide on their respective merits. If he is not a really experienced motorist, it is advisable to consult an independent expert before coming to a decision. Of course, if he wishes just to nose round the show as if he were at a horse show he can spend a very joyous day doing so. Even if he obviously does not mean business, the many questions which occur to him during his perambulations are usually answered with extreme courtesy by the salesmen on the various stands. But should some lack of interest be apparent at busy times, it must not be forgotten that the questions of would-be purchasers are likely to lead to more business than desultory inquiries from men generally interested in motor-cars, and some toleration should be shown. One of the most important points the would-be purchaser should keep in mind is that because a car is cheap in price it is not necessarily made of inferior quality material, and the workmanship embodied need not be inferior to that on higher priced cars. It should be remembered that at the present day the small low-priced car is produced in large numbers in works equipped with modern labour-saving machinery. The greater the output the better the finished article is true in many cases, since material must be purchased in huge quantities and the very best type of up-to-date automatic machinery must be used. I always find, however, when advising doctors as to the purchase of any car, that so many personal and professional factors have to be taken into account that it is almost impossible to generalise and each case has to be considered separately.

The show arrangements are on much the same lines as last year—the main hall and coach-building annexe, the new annexe, where cars as well as accessories will be shown, and the usual two public entrances, i.e., Hammersmith-road and Addison-road. There is ample space for the parking of private cars in neighbouring streets, such as Blythe-road and Russell-road, and cars can be left there with safety.

Correspondence.

"Audi alteram partem."

DIABETIC COMA IN INSULIN-TREATED DIABETES.

To the Editor of THE LANCET.

SIR,—Much has been published during the last 12 months on the technique of insulin treatment in diabetes. I have, however, seen very few records of cases of coma treated with insulin, although these cases present very special difficulties both of diagnosis and treatment. On the one hand, intercurrent infection is probably the commonest precipitating cause of coma—more especially in patients already on insulin, and the detection of the source of infection in coma may be exceedingly difficult. On the other hand, there is no time in coma for the graduated administration of insulin, and even with blood-sugar estimations it is not an easy matter to gauge the amount of insulin required. Moreover, it is probably not generally recognised what very large doses of insulin may be needed in this condition.

The following cases illustrate both the difficulties referred to above:—

CASE 1.—A girl, now 9 years old, had suffered from a severe type of diabetes for 18 months before commencing insulin. This had been started in May, 1923, when she was almost moribund; and after a long period of observation in hospital she had been discharged on a diet of 900 calories and a dose of 30 units of insulin daily, given in two injections before the morning and evening meals. Except for an attack of broncho-penumonia in January, 1924, she had remained in good health ever since, had fully regained her weight, and was attending school. Her blood-sugar had been estimated at fortnightly intervals during the year and had nearly always been below 0·17 per cent. in the afternoon. She attended the hospital on April 24th last for this purpose, when her blood-sugar was 0·11 per cent. at 4 P.M. The following day she complained of headache, her temperature rose to 102° F., and she refused to take any food. Her mother therefore discontinued the insulin, since she was fully alive to the danger of hypoglycæmia, and thought that the insulin must be stopped if no food was taken. The temperature remained high on the 26th, and she began to vomit in the evening. When seen on the morning of the 27th the vomiting had become almost constant, but there was no pain in the stomach. There was marked hyperpnœa, with an expiratory grunt suggesting pneumonia and the alæ nasi were working. At the right base there was a very definite pleuritic rub. The breath smelt strongly of acetone and the urine contained large amounts of sugar and acetone. She was ordered 60 units of insulin in the day. At 6.30 P.M. she was drowsy and still vomiting. The temperature was normal. The blood-sugar was 0·47 per cent. When seen by her doctor (Dr. C. McCay) at 10 P.M. she had just become unconscious. She was given another 20 units of insulin, making 80 units since 9 A.M., and brought by car to the hospital. On arrival at the hospital she had regained consciousness; her blood-sugar then was 0·4 per cent. A further 60 units of insulin during the night reduced her blood-sugar to 0·11 at 9.30 the following morning. Thereafter she received 40–50 units insulin daily. On examination on the morning after admission her breathing was natural and no abnormal physical signs could be found in the chest; the pleuritic rub had entirely disappeared. She was still drowsy, however, and her mental condition was very peculiar. On the following day (29th) she showed signs, for the first time, of a commencing facial erysipelas, and with its appearance the mental condition became normal. The erysipelas ran a normal course of five to six days' duration, with a high temperature and with one short relapse; but it was only possible gradually to reduce the insulin, some time after the temperature had fallen to normal, from 40–50 to 35 units daily. She is now (August, 1924) quite well again, except for the fact that she requires about 8 units more insulin daily to keep her blood-sugar within normal limits on the same diet as before.

This child therefore required 140 units of insulin in 24 hours to restore her blood-sugar to a normal figure; and the acidosis apparently persisted for some time after the blood-sugar had reached a more or less normal figure. When first seen, her condition

was strongly suggestive of a commencing pneumonia. The erysipelas did not manifest itself until four days after the commencement of her illness, and its relation to the initial symptoms remains doubtful.

CASE 2.—A married woman of 35 was seen on two occasions in January, 1924, in consultation with Dr. D. B. Spence, to whom I am indebted for the records. As the patient lived many miles away it was impossible to carry out regular blood-sugar estimations. This patient had had diabetes for between one and two years before commencing insulin in April, 1923, under the care of a London consultant. She was stated actually to have been in coma when insulin was started. For nine months she had been on a fairly strict diet, with 20 units of insulin daily. She had gained half a stone in weight, and had apparently been passing sugar at intervals during this period. For several weeks before I saw her she had been feeling depressed, and for six days had suffered from obstinate constipation. Five days previously she was said to have "caught a chill," but had not been seen by her doctor until the previous day, when insulin had been stopped for 24 hours, and she was already on the verge of coma, with drowsiness, deep breathing, and marked polyuria and glycosuria. When examined at midday on the 27th, although she had had 40 units of insulin since the previous evening, she was already in coma. The temperature was below 96° F., with a feeble pulse and marked hyperpnœa. At both bases there was a very well marked friction rub. The abdomen was distended and resistant; the bowels had been opened with an enema on the previous day for the first time for three days. The blood-sugar was 0·46 per cent., and the ferric chloride test for diacetic acid in the urine was strongly positive. She was given 140 units of insulin during the next 18 hours. This had the effect of bringing her out of coma. But on the 28th there was some sweating, she again became semi-conscious, and there was very little secretion of urine containing no sugar. She was therefore judged to be hypoglycæmic, and the administration of insulin slowed down. On the morning of the 29th the breathing had again become deeper, and there was slight glycosuria; she was given 40 units of insulin during the day.

When I saw her for the second time on the afternoon of the 30th she was completely comatose, although she had received 140 units of insulin since 1 A.M. A catheter specimen of urine showed a trace of sugar and a well-marked ferric chloride reaction. The blood-sugar was 0·16 per cent. For the past three days the temperature had varied between 98° and 100°, and the pulse between 90 and 120. There was now consolidation of the right lower lobe and friction at the left base. From this time on she became progressively worse. Insulin was discontinued the same evening, and she died in the early morning of Feb. 1st, with a terminal pyrexia of 105°. During her illness she had on an average two pints of fluids daily by the mouth and numerous rectal salines; and during the four days of intensive insulin treatment she received 400 units of insulin. Almost at the end of this period her blood-sugar was 0·16 per cent.

It may be urged that no patient on insulin should ever be in danger of coma. But insulin is now in very general use, and a large number of patients become so habituated to it that they tend to lose contact with their doctor. When it is realised how swift may be the onset of coma, especially having regard to the very large amount of fat in the average diet of the patient on insulin, it is not altogether surprising that such accidents should happen from time to time.—I am, Sir, yours faithfully,

W. T. COLLIER, *M.C.*, M.D. Oxf.,
M.R.C.P. Lond.

Oxford, August 26th, 1924.

DYSPEPSIA OF MENTAL ORIGIN.

To the Editor of THE LANCET.

SIR,—The neurotic patient is so commonly eccentric and fastidious in diet that it seems natural to accept the attitude as inevitable to the peculiar temperament of the patient, but the following extreme example, though it does not bring to light any new ætiological factors, seems worth recording, since it shows that, in some cases at least, the apparent waywardness may be the result of a logical train of thought of a kind not peculiar to morbid psychology.

The patient, an unmarried woman of 35, had suffered for some 15 years from a feeling of distension, nausea, and palpitation of the heart occurring immediately after meals. The symptoms were apparently those of an organic dyspepsia, but on close questioning it was found that they were only evoked by certain articles of food which at first sight seemed to have nothing in common. Any food that was coloured red, especially tomato soup or red gravy, salads, raw fruit, all root vegetables, eggs, and, in general, any food that was uncooked or underdone brought on the symptoms. The symptoms also occurred if she were breathed upon by a man, so that a visit to the dentist was invariably followed by a sharp attack.

On thinking over the symptoms the patient discovered that they stood to her for the chief symptoms of pregnancy, especially the feeling of distension, which often compelled her to loosen her clothes. She then revealed that she was often greatly worried by the fear that she was pregnant, although she realised that it was irrational and fantastic. The connexion between certain articles of diet and pregnancy had been formulated, unconsciously, in the following way. She knew, as quite a small child, that babies grew inside their mothers and she supposed that they grew out of the food that was eaten,[1] but observing that they did not occur promiscuously, she argued that some special sort of food must be necessary to start the process of growth. A warning not to eat watercress, since it might contain frog's eggs which would "grow inside her," seemed to provide a clue, and she thought that any food that contained life might cause pregnancy, hence her fear in later years of uncooked food, and especially of watercress and salads. Learning from the Old Testament that the Jews were forbidden to eat meat with the blood in it because "blood is the life," she assumed that the prohibition was imposed to prevent people in general from becoming pregnant, a theory that determined her reaction to underdone meat, tomato soup, and to all food that in any way resembled blood. The story of Rachel and the mandrake root accounted for the power of all root vegetables to bring on the imagined symptoms of pregnancy, and the phrase "God breathed the breath of life into Adam" for her reaction when she was breathed upon by a man.

It will be noted that the patient's mode of thought was quite logical and led, in accordance with the limited data at her disposal, inevitably to the fantastic conclusions that were expressed in the neurosis. Two pieces of folk-lore (the mandrake root and the "breath of life") were accepted with the characteristic readiness of a child and built up into her fantasies, while a close parallel to the rest of her behaviour towards food may be found in many primitive practices and superstitions. Among the Esquimaux of Baffin's Land the young girls are forbidden to eat eggs lest they conceive, and among the Coast-Salish Indians of N.W. America certain meats are proscribed for the same reason.[2] Blood itself is very commonly used in folk medicine as a remedy for barrenness. But examples of the use of magic food as an agency in conception may be found in modern times and nearer home, and Hartland records the case of a young married woman who stole some sausages in 1876 from a shop in Theobald's-road and ate them raw on the spot in order to have a child, with the result, as she related, that nine months later to a day a boy was born who was "fat and rolly like a sausage." It is interesting to notice that this story curiously resembles a dream, much as the tabus of the Esquimaux and the North American Indians resembles a neurosis.

Although the conclusions reached by the patient in childhood, and repeated later in her neurosis, are also found among primitive people, it does not seem necessary to invoke any stirrings of ancestral memory to explain the coincidence, seeing that both the child and the primitive are alike in their relative ignorance of the physiological processes, and may, therefore, be expected to arrive at similar results if they argue from similar data.

The general idea that food contains life, and that the vital energy of the plant or animal from which it was derived is not quite extinct, but can be directly imparted to the individual who eats it, was developed intensively by the patient and employed in the construction of her symptoms. But the idea seems to exist, in a hazy way, as a popular belief, if we may judge from the obstinate faith in the food value of beef-tea, &c., and the recurrent popularity of dietetic régimes dictating unfired food or raw meat. As a quasi-magical attitude towards food the general idea has obvious drawbacks, but the advantage

[1] Ernest Jones: Papers on Psycho-Analysis, p. 497.
[2] Hartland: Primitive Paternity, i., 57 et seq.

may be claimed for it of counterbalancing a purely calorimetric standard of food values, a safeguard of diminished importance since the discovery of vitamins. It seems, indeed, not impossible that the belief may rest upon an empirical knowledge of the value of fresh food and, if this be so, it might be compared to a rough paraphrase of the theory of vitamins in terms of magic and the very form of the word "vitamin" may have reinforced the popular idea that life is inherent in food, making the new discovery all the more readily acceptable as the scientific confirmation of a vague or unconscious belief. It is interesting as an example of the development along different lines of an idea that is possibly rational at bottom to compare the neurotic fantasies of the patient with the prescription of Paracelsus for manufacturing an "homunculus" by the magical "digestion" of bread and wine, and these end-results with the religious aspect of the idea in the Laws of Manu, which instruct the pure Brahmin to worship the food that he eats "because food is the life."

Some emphasis has been laid on the general character and prevalence of the patient's idea that life is inherent in food because it seems likely that it plays a part in many minor antipathies, such as would commonly be regarded as meaningless eccentricities or imputed to a delicate digestion, yet might prove explicable and susceptible of correction. One slight example may be given in the case of a young married woman, in no way neurotic, who had a horror of biting into any fruit, such as gooseberries, grapes, or stewed cherries, whose contents were semi-liquid. The feeling was carried back to childhood and the memory of stepping on gooseberries lying under the bushes, then to stepping on an egg, and the repugnance was found to be due to the idea that she was "destroying life."

I am, Sir, yours faithfully,

F. A. HAMPTON.

Queen Anne-street, Cavendish-square, W., Sept. 2nd, 1924.

AMMONIA AND CHLORINE IN THE DISINFECTION OF WATER.

To the Editor of THE LANCET.

SIR,—I have noted with interest the annotation in your issue of August 23rd on the effect of ammonia on the chlorination of water as reported by Major C. H. H. Harold and Captain A. R. Ward, and since then I have had an opportunity of reading the original article as published in the *Journal of the Royal Army Medical Corps*. As I was responsible for the introduction of the chloramine process for water purification, perhaps I might be permitted to make a few remarks on the results obtained. After I had confirmed Rideal's observation that ammonia increases the germicidal effect of bleach solutions,[1] the details necessary for the successful application of the process on a large scale were worked out,[2] and it was adopted by Ottawa, Canada, for the treatment of the whole supply of 20 mill. imp. galls. per diem. It has also been used successfully at Denver, Colo., for the prevention of aftergrowths, and I believe that it has been used by Diénert in Paris.

When the process was still in the experimental stage I realised that a combination of chlorine gas and ammonia would be an almost ideal combination in many respects, but laboratory experiments showed that the tendency was for the formation of ammonium chloride which has no germicidal value. The research department of Messrs. Wallace and Tiernan, New York, studied this combination, and it was tried out in Ottawa in 1919. The results, however, were so inferior that it was decided to revert to the former mixture of bleach and ammonia. I also used ammonia and bleach in experimental work in the Vladivostock area in 1918, but owing to the possibility that *E. histolytica* might be present, it was not considered advisable to use this process for the sterilisation of the water-supply of the troops as there is no experimental evidence as to the effect of chlorine compounds on these organisms.

The disparity between my results and those of Harold and Ward might be due to the use of autoclaved water by the latter, whilst I used untreated fresh water containing a relatively large amount of colour (80 p.p.m. Pt-Co scale). The treatment of a natural water by heat under increased pressure would result in a definite increase in the pH due to the loss of free and half bound carbonic acid. The resulting slight alkalinity would produce some hypochlorite on the addition of chlorine gas, or its aqueous solution, and the conditions would then be favourable for the formation of chloramine. The same condition would also retard the velocity of the action of the bleach solutions.

Before any scheme involving a combination of ammonia and chlorine gas is tried out in the field I would suggest that experiments should be made with waters at their natural pH and also that the conditions, found by practice on a large scale to be the most favourable for bleach and ammonia, should be tried out. In my opinion the chloramine process is essentially one most suitable for small doses and long contact periods. Short contact periods are often essential in military work, and in this case it would appear desirable to follow the suggestion of Sir Alexander Houston (Reports to Metropolitan Water Board) of using super-chlorination followed by de-chlorination. This process was used to some extent during the war, but its possibilities do not appear to have been developed to the full extent.

I am, Sir, yours faithfully,

JOSEPH RACE.

Devonshire Hospital, Buxton, Sept. 2nd, 1924.

[1] THE LANCET, 1916, ii., 71.
[2] Jour. Amer. Waterworks Assoc., 1918, v., 73.

ANTHELMINTICS.

To the Editor of THE LANCET.

SIR,—On reading the very interesting leading article on anthelmintics in your issue of July 19th it occurs to me that a little more might be added in the presentation of this subject. For one thing, your surmise that the error in the work of Hall and Hamilton on the anthelmintic constituents of chenopodium was due to distillation at insufficiently low pressure is apparently correct. This is the conclusion recently arrived at by my colleague, Mr. Hamilton, after a conference on this subject with Dr. Nelson of the Bureau of Chemistry of the United States Department of Agriculture, and a comparison of the work with that of Dr. Nelson.

As regards carbon tetrachloride, the question of safety brings to light a somewhat unusual condition. Carbon tetrachloride appears to be a drug which has no minimum lethal dose. It has been given in hundreds of thousands of human cases—over a hundred thousand in Fiji alone—and has been given to scores of dogs experimentally and to many thousand in veterinary practice. Ordinarily dogs will tolerate enormous doses, up to 25 c.cm. per kilo (or 83 times the therapeutic dose of 0·3 c.cm. per kilo of 100 per cent. effective action against hook-worms), without evident bad results. Human patients have taken as much as 30 c.cm. in the course of a few consecutive days. Deaths among human beings and among dogs and fur foxes have in almost all cases followed the administration of a therapeutic dose. On the other hand, chenopodium has a safety factor of only five on the basis of the therapeutic dose for removing ascarids from dogs (0·1 c.cm. per kilo) as compared with the minimum lethal dose of 0·5 c.cm. per kilo, or a safety factor of only 2·5 on the basis of a moderately effective (much less than 100 per cent. effective) dose for removing hook-worms from dogs (0·2 c.cm. per kilo) as compared with the minimum lethal dose.

The extreme tolerance of dogs and man for carbon tetrachloride in the great majority of cases suggests

at once that the determining factor leading to bad results is to be sought in the patient, and the evidence at hand bears this out. Gastro-enteritis, especially of a hæmorrhagic type, is apparently a contra-indication for the use of carbon tetrachloride, as are cirrhosis of the liver, nephritis, or acute or chronic alcoholism. In other words, any conditions favouring absorption of the drug are contra-indications, as are existing lesions in such viscera as may be habitually injured to some slight extent by the small amount of the drug usually absorbed. A seriously damaged liver or kidney may not tolerate a slight additional injury.

As regards santonin for removing hook-worms, there are a number of reports of its use in human and veterinary medicine, showing that it is entirely ineffective. I have given to dogs large amounts of santonin in single dose and in doses repeated for long periods, and found it entirely ineffective against hook-worms.

With reference to whether carbon tetrachloride is a true anthelmintic, I am of the opinion, after ten years spent in the experimental investigation of anthelmintics, that it is. The word anthelmintic is a generic term, just as the word poison is a generic term, the anthelmintics being a heterogeneous group of poisons which poison parasitic worms. How they poison them is of little importance from the standpoint of medical practice and results, although it is a matter of great importance from a scientific standpoint. If we make academic distinctions in any field we cloud the field and waste time. The distinction between vermifuge and vermicide is another academic distinction of no real value whatever. One may say that a vermifuge drives out worms, alive or dead, and that a vermicide kills worms and may or may not have sufficient purgative action to remove them promptly. But if the worms are removed it is of no importance whatever whether they are alive or dead; a worm removed is for all practical purposes a worm dead, and whether the drug kills it or it dies as a result of removal from the only environment in which it can live is of no consequence. Whether an anthelmintic is also purgative or is not purgative is of interest only as the administration of a separate purgative is unnecessary or is necessary. The subject of anthelmintic investigation would proceed faster if we would drop these antiquated terms, adopted at a time when we knew almost nothing of anthelmintic action, and speak and write in terms of anthelmintic action as one thing, and of purgation as another. Anthelmintics may be actually purgative, as in the case of arecoline hydrobromide; mildly laxative, as is the rule in the case of carbon tetrachloride; or actually constipating, as in the case of chenopodium. Since purgation is desirable in the case of all anthelmintics, it follows that such drugs as arecoline hydrobromide should not be accompanied by a purgative, since purgation is assured in advance, that such drugs as carbon tetrachloride should be accompanied by a purgative to ensure purgations, and that such drugs as chenopodium should be accompanied by a purgative, additional purgatives or enemas being given a few hours later if prompt purgation does not follow the initial dose.

So far as any knowledge as to the specific action of anthelmintics on worms is concerned we know practically nothing, and this is a subject which merits extensive investigation. From a practical standpoint we are directing attention at present to finding anthelmintics which will be effective and safe. An ideal anthelmintic would be 100 per cent. effective and 100 per cent. safe. That we shall ever find such a poison, one injuriously affecting one kind of animal, the parasite, and in no wise injuriously affecting another kind of animal, the host, is unlikely. Whether a knowledge of the manner in which anthelmintics affect parasites would aid in any way in finding an approximately ideal anthelmintic is doubtful, but we should have the information for what it might be worth as well as for its purely scientific interest. At the present time the most promising line of attack in solving the problems of anthelmintic medication lies along the lines of correlation of anthelmintic efficacy with the chemical composition and physical properties of anthelmintics, and investigations along these lines are already beginning to point to some conclusions which promise to be of considerable value.

I am, Sir, yours faithfully,

MAURICE C. HALL,
Zoologist.

United States Bureau of Animal Industry,
August 26th, 1924.

UNIVERSAL ANÆSTHETIC APPARATUS.

To the Editor of THE LANCET.

SIR,—Dr. R. J. Clausen criticises the combined anæsthetic pump and suction apparatus on the ground that it is fitted with rubber tubing for its connexions. I agree that theoretically it would be better to have metal pipes fixed with nuts and unions, making the whole apparatus into one rigid unit, but practically there are many objections. In the first place, the detachability of the bottles and other parts for cleaning would be impaired. Secondly, a large number of soldered joints tend towards fracture when in hard use; many car manufacturers are now, in fact, substituting flexible pipes for rigid ones where practicable. Furthermore, if the whole system were absolutely gas-tight at any pressure an accident might arise if the blow-off device became inoperative. Lastly, expense is a serious matter—at any rate to the anæsthetist. The pressure-tubing used in the apparatus is made of composition which does not perish in several years of use and the joints are gas-tight up to 70 mm. Hg. The only serious objection to its use is that, if a dry gas is forced through it at very high pressure, it is possible for it to become electrically charged, and a small static spark may result. It is conceivable that a highly explosive mixture such as ethylene-oxygen might become ignited in this way, but I should imagine that the risk is too infinitesimal to be worth considering.

I am, Sir, yours faithfully,

C. LANGTON HEWER.

York-terrace, Regent's Park, N.W., Sept. 6th, 1924.

THE CLINICAL THERMOMETER AS A CARRIER OF INFECTION.

To the Editor of THE LANCET.

SIR,—There is no doubt about the risk, but as the thermometer is a necessary equipment for the diagnosis of disease why not minimise this risk by the use of a "family" thermometer? In a great number of patients' houses now we find clinical thermometers provided. The class of people who use them do not like the idea of having the doctor's thermometer put in their mouths after being used by strangers in all forms of disease. If every household had its own clinical thermometer it would prevent the spread of infection to others.

I am, Sir, yours faithfully,

Berkeley-street, W., Sept. 9th, 1924. HENRY DUTCH.

DONATIONS AND BEQUESTS.—The executors of the late Sir Samuel Turner, of Rochdale, one of the pioneers of the asbestos industry, announce that he has left, in addition to the endowment of other charities, £3000 to Rochdale Infirmary, £1000 each to the Rochdale District Nursing Association and the Crippled Children's Union, £500 to the Rochdale and District Society for the Blind, and £4000 to the National Children's Home and Orphanage.—Mr. Walter John Tillett, Penarth, shipowner, left £10,000 to the King Edward VII. Hospital, Cardiff (Cardiff Infirmary), upon trust to devote the income firstly towards the maintenance of the Elizabeth Tillett bed in memory of his wife, and subject thereto for the general purposes and upkeep of the hospital.—Miss Eliza Moore, of St. Annes-on-the-Sea, Lancs, amongst other bequests, bequeathed £4000 to the Beckett Hospital and Dispensary, Barnsley, Yorks, to endow four beds to be known as the William Moore, Elizabeth Moore, Eliza Moore, and May Elizabeth Moore beds; £4000 to Dr. Barnardo's Homes, £2000 to Dr. Stephenson's Wesleyan Orphan Homes, £2000 to the National Society for the Prevention of Cruelty to Children, £2000 to the National Institution for the Blind, and £2000 to the National Institution for the Deaf and Dumb. Altogether Miss Moore left over £23,000 to various charities.—Mr. Albert Henry Bruton left £500 to the Gloucester Royal Infirmary.

Obituary.

SIR ANDREW JOHN HORNE, F.R.C.P. IREL.

Sir Andrew Horne, joint Master of the National Lying-in Hospital, Dublin, died on Sept. 5th at his residence, Merrion-square, Dublin, at the age of 68, after a long illness. He had been for many years one of the leading obstetric and gynæcological physicians in Ireland. Born in Ballinasloe, Co. Galway, Horne spent his schooldays at Clongowes Wood College, Co. Kildare, proceeding to Dublin and Vienna for his medical training. He became a Licentiate of the Royal College of Surgeons in Ireland in 1877, and a Fellow of the Royal College of Physicians of Ireland in 1885. Of the latter College he was Vice-President from 1894 to 1896, and President from 1908 to 1910. He early devoted himself to the special study of obstetrics, and was assistant Master of the Rotunda Hospital from 1880 to 1883. On the foundation of the National Lying-in Hospital in 1894 Horne was chosen as Master, a position he continued to hold up to his death, though in recent years a joint Master shared the duties. At the close of his period of presidency of the Royal College of Physicians he was knighted by Lord Aberdeen, then Lord-Lieutenant of Ireland.

During his long career in the profession Horne was a steady and conscientious worker, and for many years he enjoyed a large practice. He took much interest in the work of the Section of Obstetrics of the Royal Academy of Medicine in Ireland, of which section he was President more than once. Though he did not often write for the journals, he was a frequent contributor to the Proceedings of the Academy, and attended its meetings with great regularity. In professional affairs generally he took an active part, and was a member of many committees, among others the Central Midwives Board. Personally he was a man of great charm, genial, sympathetic, and unassuming. Both in the profession and outside it he had innumerable friends. Of his surviving family one son is a member of the medical profession.

ALBERT HAWORTH, M.Sc., M.B., CH.B. MANCH.

IT is with sincere regret that we record the death of Dr. Albert Haworth, assistant lecturer in chemical pathology to the Manchester Royal Infirmary, at the age of 36. Last July, in the course of his duties, Dr. Haworth carried out a post-mortem examination in the Royal Infirmary, in doing which he received a cut on his finger from a projecting rib of the cadaver. An infection followed which subsequently seemed to disappear, but later grave symptoms manifested themselves and he was removed to the infirmary, where he died on Sept. 6th from pneumonia. Mr. C. W. W. Surridge, the Manchester City coroner, in returning a verdict of accidental death, said Dr. Haworth had died from an injury received whilst carrying out important public duties, and his death in these circumstances was very regrettable. Dr. Haworth was born at Harwood, near Blackburn. In 1912 he took the degree of M.Sc. at Manchester University, specialising in chemistry. Attracted to medicine, he graduated as M.B., Ch.B. in 1920, but his bent was rather towards the scientific side of medicine than its practical aspects, and more especially did chemical pathology appeal to him. He was for a time a demonstrator in the pathological department and later studied pathological chemistry at St. Thomas's Hospital, London. Quite recently he was appointed lecturer in chemical pathology at the University of Leeds and should have taken up his duties there next month. Dr. Haworth was married, and to his widow, who is also a member of the medical profession, we extend our heartfelt sympathy.

THOMAS SYDNEY SHORT, M.D. LOND., D.P.H. CAMB.

Dr. T. Sydney Short, of 85, Edmund-street, Birmingham, senior physician to the General Hospital, Birmingham, died recently at Claverdon, Warwick, while on holiday. Dr. Short was born in 1860 at Sheffield. He received his medical education at University College, London, and qualified as M.R.C.S. Eng. and L.S.A. in 1883. Two years later he took the degree of M.B., and in 1886 he gained the medal in hygiene at University College, obtaining the D.P.H. Cambridge in the same year.

In 1891 he became an M.D. Lond. and M.R.C.P. Lond. On first qualifying, Dr. Short held the post of house physician at King's College Hospital, and later that of assistant demonstrator in anatomy at the medical school. After a period as resident medical and surgical officer at Jaffray Suburban Hospital, Birmingham, he was appointed assistant honorary physician to the Birmingham General Hospital in 1891, and remained on the staff of that institution until his death. He was also consultant physician to the General Dispensary, Birmingham. Dr. Short contributed several articles to medical journals, dealing with such subjects as the treatment of epilepsy, the treatment of arthritis, and the dietetic treatment of gout and kindred conditions.

Medical News.

UNIVERSITY OF OXFORD.—Lieut.-Colonel Sir Charles H. Bedford, who recently received the honorary degree of Doctor of Civil Law (D.C.L.), was attached for 22 years to the Indian Medical Service. His work in India was carried out mainly as chemist to the Government, and he conducted a long series of successful scientific and technical researches on alcohol for the Customs and Excise Departments. On retiring from the Service in 1911 he received the honour of knighthood. Since then his expert knowledge on power and industrial alcohol development has been placed at the disposal of the Colonial Office, and he was the first general manager of the Association of British Chemical Manufacturers. Edinburgh and St. Andrews Universities have previously conferred upon him honorary degrees.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—The Fellowship of Medicine and Post-Graduate Medical Association announce that an intensive course in general medicine and surgery and the various special departments will be given at the Westminster Hospital, S.W. 1, from Sept. 22nd to Oct. 3rd, from 10.30 A.M. to 5.30 P.M. each day. The first lecture will be given by Mr. Walter Spencer at 10.30 A.M. on Monday, Sept. 22nd, on Oral Sepsis. The names of those wishing to attend should be sent to the Secretary of the Fellowship of Medicine, 1, Wimpole-street, W. 1, if possible by Sept. 19th.

THE Central Association for Mental Welfare has arranged a course in mental diseases for secretaries of associations for mental welfare and for other experienced social workers, to be held from Monday, Oct. 27th, to Saturday, Nov. 1st, at the Maudsley Hospital, Denmark Hill, London, S.E., under the direction of Dr. Edward Mapother, medical superintendent of the hospital. The course will consist of lectures on mental diseases and mental deficiency, with clinical demonstrations at the Maudsley and County Mental Hospitals, and at certified institutions for defectives. Early application must be made to the Hon. Secretary, 24, Buckingham Palace-road, London, S.W. 1.

THE LATE DR. V. F. ALLEN.—Vernon Francis Allen, of Swaffham, Norfolk, whose death at the age of 58 occurred recently as the sequel to a motor accident in which he was injured some months ago, was surgeon to the Swaffham Cottage Hospital and a well-known local figure. He was the third son of Christopher Allen, J.P., of Stone Hall, Glandore, Co. Cork, and qualified L.R.C.S. & P. Edin. and L.R.F.P.S. Glasg. in 1891. A year or two later Dr. Allen began to practise in Swaffham, first as assistant, later as partner to Dr. R. B. Marriott, eventually in 1898 taking over the entire work. In 1898 he also became an urban district councillor, a position he held until 1910. In 1922 he was joined in his practice by Dr. W. B. Cathcart. Dr. Allen took a keen interest in breeding greyhounds and in coursing. He is survived by a widow and two children.

A SERIES of eight lectures will be given this autumn by members of the lecturing staff of the People's League of Health on the Mind and What We Ought to Know About It. These will be delivered at the Medical Society's headquarters, 11, Chandos-street, Cavendish-square, W.1, beginning on Monday, Oct. 20th, at 6 P.M., and continuing on subsequent Monday evenings till Dec. 8th. The lectures will be delivered by Dr. Bernard Hart, Dr. Thomas Beaton, Dr. R. G. Rows, Sir Maurice Craig, Sir Robert Armstrong-Jones, Sir Frederick Mott, Dr. W. A. Potts, Dr. A. F. Tredgold. A syllabus of the course will be sent on application to the hon. organiser, 12, Stratford-place, London, W.1.

ROYAL INFANT ORPHANAGE, WANSTEAD.—The next half-yearly election for the admission of fatherless children to the orphanage at Wanstead, E.11, will be held in November. Children under 7 years of age are eligible, and applications for information and nomination papers should be addressed to the secretary at the orphanage.

MEMORIAL TO THE LATE MR. NEWBOLT.—A brass tablet to the memory of the late Mr. G. P. Newbolt, surgeon of Liverpool, was unveiled by the Lord Mayor of Liverpool on Sept. 4th at Leasowe Hospital for Crippled Children. The wording on the memorial tablet reads: "In gratitude to God for the memory of George Palmerston Newbolt, C.B.E., F.R.C.S., First Chairman of the Medical Board of this Hospital. A great surgeon, a lover of children, a faithful servant of his fellow men. 'His name a great example stands.'"

THE LATE DR. T. MCCRAITH FOLEY.—Thomas McCraith Foley, L.R.C.P. & S. Irel., who died recently at Scarborough, was medical officer to the Union Infirmary of that town. He was a son of the late Rev. Patrick Foley, of Kilscoran, Co. Wexford, Ireland, and qualified in medicine in 1887. After some experience as a ship's surgeon, including service on the Sultan of Morocco's yacht, he started practice in Scarborough about 30 years ago, and took an active interest in municipal affairs. He was a member of the Scarborough town council and acted for a time as chairman of the health subcommittee of the council. He was connected with the 5th Yorkshire Regiment (Territorials) for many years and retired with the rank of surgeon-colonel. During the war, from 1914 to 1917, he was attached to the R.A.M.C. Dr. Foley is survived by his widow.

THE LATE DR. W. NORMAN EVANS.—William Norman Evans, M.R.C.S., L.R.C.P.Lond., who died recently as the result of a sudden heart attack, at his residence at 43, Rosslyn-hill, Hampstead, in his sixtieth year, was a member of a family which has been associated with Hampstead for 150 years. He was the sixth in uninterrupted succession to practise medicine in the borough. His father was Herbert Norman Evans, M.B. Oxf., of Hampstead House, Seaford, Sussex, to whose practice in Thurlow-road he succeeded about 30 years ago. He received his medical education at St. Bartholomew's Hospital, qualifying in 1887. He was for some years Surgeon-Captain of the 19th Middlesex R.V., commanded the 5th London Volunteer Infantry Brigade Bearer Company, and was formerly the medical officer of the Cripples' and Incurables' Home for Children at Hampstead. At the time of his death he was senior medical officer of the Hampstead Provident Dispensary. He had been in partnership with Dr. W. E. Hills, of Church Row, since 1903. Dr. Evans leaves a widow and two daughters.

MEMORIAL TO THE LATE SIR WILLIAM MACEWEN.—At a meeting held in the Hall of the Royal Faculty of Physicians and Surgeons, Glasgow, on May 22nd and reported in THE LANCET (May 31st, 1924, p. 1133), it was resolved to promote a fitting memorial to the life and work of the late Sir William Macewen. The meeting was a full and enthusiastic one, and a strong general committee was formed, as well as an executive representative of the different interests, both committees being given power to add to their number. It was decided, as the result of several meetings which have been held since, that the fund to be collected shall be applied to three main purposes, in the following order: (1) The provision of a bronze bust of Sir William Macewen, by Mr. G. H. Paulin, to be placed in the University, and a replica for Lady Macewen; (2) the establishment of a memorial lecture to be known as "The Sir William Macewen Lecture," to be delivered annually or biennially, dealing with any branch or aspect of surgical science; (3) the foundation of a Macewen medal or prize in surgery, to be awarded annually. It has not been decided yet whether this shall be assigned to the class of surgery at Glasgow University or shall be given a wider application. It is proposed to aim at the collection of a fund amounting to £3000, towards which a number of subscriptions, varying from £1 1s. to £100, have already been received. Intending subscribers should communicate with the hon. treasurer, Mr. James Macfarlane, D.L., LL.D., Wesleyan-st., Glasgow, S.E.

Messrs. Ernest Benn announce the forthcoming publication of "The Chemistry of the Blood in Clinical Medicine," by Dr. C. L. V. De Wesselow, chemical pathologist to St. Thomas's Hospital; and "Practical Surgery Illustrated," by Victor Pauchet, translated by F. R. H. Atkinson, M.D., with a special introduction by Sir Charles Gordon Watson, F.R.C.S.

NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC.—A post-graduate course will be held from Oct. 6th to Nov. 28th, consisting of the following subjects: out-patient clinics, clinical lectures and demonstrations; lectures on the anatomy and physiology of the nervous system; lectures on the pathology of the nervous system; clinical demonstrations on methods of examination. Copies of the syllabus may be obtained from Dr. J. G. Greenfield, Dean of the Medical School, at the Hospital, Queen-square, Bloomsbury, London, W.C.1.

DANGEROUS DRUGS ORDER.—The wording of the conditions attached to the Order made on August 15th, 1921, under the Dangerous Drugs Act, 1920, for the exemption of certain hospitals and other institutions from the Dangerous Drugs Regulations, was found in certain respects to impose restrictions on medicine which did not themselves come within the scope of these Regulations. In order to make it clear that such substances are not to be regarded as subject to the conditions attached to the Order, the Home Secretary has now added to both Schedule I. and Schedule II. a new condition, which runs: "Nothing in this Schedule shall affect any medicine or other substance to which the Regulations do not apply." The alteration has been effected by the issue of a new Order (H.M. Stationery Office, 1*d.*), entitled the "Dangerous Drugs (Hospital General Exemption) Order (1924)," which replaces the Order of August 15th, 1921. Apart from the change of wording needed to correct the misunderstanding, this Order differs only in verbal points from the former Order.

Appointments.

BENTHAM, ETHEL, M.D. Brux., has been nominated by the Minister of Health to be a Member of the Metropolitan Asylums Board.

DORMER, P. A., M.D. Dub., B.A.O., D.P.H., has been appointed Medical Officer of Health for Jarrow.

DUNLOP, A. G., Certifying Surgeon under the Factory and Workshop Acts for the Worksop District of the County of Nottingham.

NEGUS, V. E., M.S. Lond., F.R.C.S. Eng., Junior Surgeon for Diseases of the Throat and Nose at King's College Hospital.

SINCLAIR, JAMES DONALD, M.R.C.S. Eng., L.R.C.P. Lond., to be one of the Medical Referees under the Workmen's Compensation Act, 1906, for the districts of the Barnard Castle, Darlington, Richmond County Courts (Circuit No. 2), and the Leyburn and Northallerton County Courts (Circuit No. 15).

STANTON, W. E., L.M.S.S.A. Lond., Certifying Surgeon under the Factory and Workshop Acts for the Market Deeping District of the County of Lincoln.

WOOD, DOROTHY, M.R.C.S. Eng., L.R.C.P. Lond., House Surgeon to the New Sussex Hospital for Women and Children, Brighton.

The Devon Royal Mental Hospital, Exminster: SOLLY, R. V., M.D., B.S. Lond., M.R.C.P. Lond., F.R.C.S. Eng., Consulting Pathologist; MUIR, D. MILLER, M.R.C.S. Eng., L.R.C.P. Lond., D.M.R. & E., Consulting Radiologist; LOCK, NORMAN F., F.R.C.S. Eng., M.B., Ch.B., L.R.C.P. Lond., Consulting Surgeon; ACKLAND, J. M., M.R.C.S. Eng., L.D.S., Consulting Dental Surgeon; HAWKER, G. P. D., M.D., B.C. Camb., Consulting Ophthalmic Surgeon.

Vacancies.

For further information refer to the advertisement columns.

Barnsley, Beckett Hospital and Dispensary.—H.P. £120.

Barnsley County Borough.—Asst. M.O.H. and Asst. Sch. M.O. £600.

Birkenhead County Borough.—Asst. M.O. £450, res.

Bradford Royal Infirmary.—Two H.S.'s and one H.P. Each £150.

Central London Ophthalmic Hospital, Judd-street, St. Pancras, W.C.—H.S. £100. Also Jun. H.S. £50.

Evelina Hospital for Children, Southwark, S.E.—H.P. £120.

Hospital for Epilepsy and Paralysis, Maida Vale, W.—Med. Reg. £100.

Hospital for Sick Children, Great Ormond-street, W.C.—H.S. £50.

Hull, Victoria Hospital for Sick Children.—H.P. £100.

Leeds City.—Asst. Clin. Tuberculosis O. £600.

Liverpool University.—Prof. of Anatomy. £800.

London Lock Hospital, 91, Dean-street, W.—H.S. £200.

Manchester, St. Mary's Hospitals.—Four H.S.'s. Each £50.

Miller General Hospital for South-East London, Greenwich-road, S.E.—Hon. M.O. for Skin Dept.

National Hospital for Diseases of the Heart, Westmoreland-street, W.—M.O. for Out-patients. £125. Phys to Out-patients.

Northampton General Hospital.—Hon. P.

Norwich, Norfolk and Norwich Hospital.—Cas. O. and H.S. £150.

Nottingham General Dispensary.—Res. S. £250.
Pietermaritzburg, S. Africa, Grey's Hospital.—H.S. £400.
Plymouth, South Devon and East Cornwall Hospital.—H.S. and H.P. £100 and £50 respectively.
Prince of Wales's General Hospital, Tottenham, N.—H.S.'s, H.P., Each £150. Also Jun. H.S. and H.P. Each £110.
Queen's Hospital for Children, Hackney-road, E.—H.S. £100.
Royal Ear Hospital, Dean-street, Soho.—Reg. £50.
Royal Free Hospital, Gray's Inn-road, W.C.—Med. Reg.
Royal National Orthopædic Hospital, 234, Great Portland-street, W.—Two H.S.'s. Each £150.
Royal Naval Medical Service.—Surg. Lieuts. 25*s.* per day.
St. Marylebone General Dispensary, 30, Marylebone-lane, W.—Hon. P.
St. Marylebone Hospital, Ladbroke-grove, W.—Third Asst. M.O. £300.
St. Peter's Hospital for Stone, Henrietta-street, Covent Garden, W.C.—H.S. £75.
Seamen's Hospital Society, Greenwich.—H.S. for Albert Dock Hospital. Also H.P. and H.S. at Dreadnought Hospital. Each £150.
Shanghai Municipal Council, Public Health Department.—Asst. Path. £1250.
Sheffield Royal Infirmary.—Res. Surg. O. £200.
South London Hospital for Women, Clapham Common, S.W.—H.P. and three H.S.'s. Each £50.
West London Hospital, Hammersmith-road, W.—H.P. and two H.S.'s. Each £100.
Winchester, Royal Hampshire County Hospital.—H.P. £150.

The Chief Inspector of Factories, Home Office, London, S.W. announces a vacant appointment at Kirkwall, Orkney.

Births, Marriages, and Deaths.

BIRTHS.

BARRY.—On August 31st, at The Chestnuts, Roos, E. Yorks, the wife of J. H. Barry, L.R.C.P. & S. Irel., of a son.
BASTIAN.—On Sept. 5th, at St. David's-road, Southsea, the wife of Surgeon-Commander W. Bastian, R.N., H.M.S. *Dryad*, of a daughter.
HADFIELD.—On August 31st, at "The Red House," Beaconsfield, the wife of J. A. Hadfield, M.B., Ch.B. Edin., of a son.
MARKS.—On Sept. 3rd, at Inverness-terrace, Hyde Park, the wife of Maurice J. Marks, L.D.S. R.F.P.S. Glasg., of a son.
MCELLIGOTT.—On Sept. 6th, at 177, Westmount-road, Eltham, S.E.9, to Dr. Geraldine, wife of Dr. E. T. McElligott—a son.
REICHWALD.—On Sept. 1st, at Timber Hill, Ashtead, Surrey, the wife of Dr. M. B. Reichwald, M.B., B.S. Lond., of a daughter.
STOCKER.—On Sept. 2nd, at Glebe Croft, Bakewell, the wife of Major C. J. Stocker, M.D. Camb., I.M.S., of a son.

MARRIAGES.

WILSON—CURJEL.—At Christ Church, Simla, on the 16th August, 1924, by the Revd. C. H. Hemming, William Robert Wilson, Indian Civil Service, to Dagmar F. Curjel, M.D. Glasg., D.P.H. Camb., Assistant to the Inspector-General of Civil Hospitals, Punjab.
WOOD—WOLSELEY.—On Sept. 6th, at St. Stephen's, Twickenham, Edward Archer Wood, L.R.C.P. Lond., M.R.C.S. Eng., L.S.A., Dulwich, to Minnie Bathurst Wolseley, daughter of Henry John Wolseley, M.B., C.M. Edin., and Mrs. Wolseley, also of Dulwich.

DEATHS.

ALLEN.—On August 30th, at Swaffham, Norfolk, Vernon Francis Allen, L.R.C.P. & S. Edin., aged 58.
ARMSTRONG.—On August 31st, at Victoria-road, Old Charlton, Lieut.-Col. John Armstrong, L.R.C.P. & S. Irel., R.A.M.C. (retired).
DOUGLAS.—On August 15th, at Adelaide, South Australia, Archibald Home Douglas, M.D., formerly residing in Edinburgh.
EVANS.—On August 31st, at Rosslyn-hill, Hampstead, N.W., suddenly, William Norman Evans, M.R.C.S. Eng., L.R.C.P. Lond.
GRIFFIN.—On August 21st, Montagu Laurence Griffin, M.B., B.Ch., B.A.O. Dub., of Plymouth, aged 64.
GULLAND.—On Sept. 4th, at Malvern Hill House, Cheltenham, Alexander Dudgeon Gulland, Surgeon-General, M.D. Edin., in his 91st year.
HORNE.—On Sept. 5th, at Merrion-square, Dublin, Sir Andrew John Horne, F.R.C.P. Irel., aged 68.
MURRAY.—On Sept. 2nd, at Aberdeen, John Murray, M.B. C.M. Aberd., Lieutenant-Colonel, A.M.D., of Mastrick and Ashburn-gardens, S.W., in his 82nd year.
NEEDHAM.—On Sept. 6th, at Bournemouth, Frederick Needham, M.D. St. And., M.R.C.P. Edin., M.R.C.S. Eng., L.S.A., late Commissioner of the Board of Control, aged 88.
PATERSON.—On Sept. 2nd, very suddenly, at Buncrana, Co. Donegal, Ireland, William Bromfield Paterson, F.R.C.S. Eng., L.D.S., of Manchester-square, London, W., aged 63.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

THE Manager of THE LANCET would like to purchase copies of the issue of Feb. 2nd, 1924, for which subscribers may have no further use. He will be pleased to pay 1*s.* each for them. Such copies should be addressed to him at 423, Strand, London, W.C. 2.

Notes, Comments, and Abstracts.

LABORATORY FACILITIES UNDER THE NATIONAL HEALTH INSURANCE.

BY T. LISTER CROFT, LL.B.,
SECRETARY, MEDICAL AND PANEL COMMITTEE, WEST RIDING OF YORKSHIRE.

AT the recent British Medical Association Conference held in Bradford the Medical Sociology Section discussed the question, "Has the National Insurance Act justified its existence?" One of the speakers, Dr. G. B. Hillman, of Wakefield, dealing with the question from the general practitioner's point of view, referred to the West Riding Scheme for Laboratory Facilities as an instance of progressive action on the part of panel committees. This statement has created some inquiry as to the scope and character of this scheme, and the following particulars may be of interest. It would be more correct to refer to these facilities as an arrangement with the Public Health Department of the West Riding County Council rather than as a fully matured scheme.

The question of laboratory facilities was first raised by the West Riding Panel Committee in 1919. The County Council were at the time rendering quite voluntary assistance to the general practitioners in the area by the examination of specimens, but no definite arrangement was in force. It was felt by the Panel Committee that something more was required. The question was discussed and considered, and ultimately the following resolution was passed:—

"That in the opinion of this Committee the time has arrived when laboratory facilities should be provided in the West Riding for the more scientific investigation of disease than is possible with the facilities at present available."

A copy of this resolution was sent to the West Riding Insurance Committee and also to the Ministry of Health, and the resolution was subsequently approved by the West Riding Insurance Committee, who intimated such approval to the West Riding County Council and the Ministry of Health.

A subcommittee continued to work on the matter for some time, and ultimately presented the following suggested scheme which was approved and adopted by the Panel Committee.

Suggested Scheme.

1. That every insured person should have access through his or her doctor to every kind of laboratory examination and vaccine treatment which the doctor considers he or she needs for the proper treatment of any illness.
2. That every panel doctor should have access to the laboratory and the right of consultation with the bacteriologist on any specific matter referred by the former to the latter.
3. That laboratory facilities should be given as an "additional benefit."
4. That the most satisfactory arrangement would be the provision and maintenance of a laboratory equipped with staff and all needful requirements, but—failing this—that an arrangement should be made with some one or more laboratories at present existing for the work to be done at a definite scale of fees.
5. That in the event of a separate laboratory being created—(*a*) small stocks of outfits (for urgent cases) should be distributed amongst representative doctors (such as members of the local medical committee) for supply to doctors on application; (*b*) that the advice and aid of the bacteriologist should, as far as possible, be available to doctors for demonstrating methods difficult in technique (such as lumbar punctures, &c.).
6. That if existing laboratories are utilised some such arrangement as in 5 (*a*) be made with the contracting laboratory.

Staff Required.—One well-qualified and specialised bacteriologist; one unqualified laboratory assistant; one (part-time) cleaner or caretaker. Approximate initial cost, £1100. Approximate annual cost, £2500 to £3000.

This scheme has never operated, as it was unfortunately brought forward at a time when it could not possibly be financed. It is interesting to note that so far as the West Riding, with its population of 500,000 is concerned, the cost would not run to more than 1½*d.* per insured person per annum.

Eventually, as a result of the Panel Committee's resolution and other circumstances which arose, a conference was arranged between the Panel Committee and the West Riding Public Health Committee. At this conference the Panel Committee stated that its reason for bringing forward the question and formulating the scheme arose from the urgent necessity for suitable laboratory facilities being provided for obtaining adequate scientific treatment in all cases. They pointed out that the health of the individual resulted in the general health and well-being of the community. The county authorities stated that they had every desire to help the general practitioner, and expressed themselves as willing and anxious to meet the position by

doing all laboratory work as far as they possibly could and not limiting the work to so-called public health work.

The Panel Committee emphasised its desire that ultimately an additional medical benefit should be established and financed in the form of "laboratory benefit" for all insured persons. In the meantime, on behalf of the general practitioners, the Panel Committee gratefully accepted the proposed extended use of the County Laboratory and expressed the hope that if and when laboratory benefits were established the working of any scheme in connexion therewith might be linked up with the County Laboratory.

The arrangements thus come to with the county authorities have been working since 1922 with most excellent and beneficial results. Under these arrangements panel practitioners in the West Riding are able to obtain the infinite variety of bacteriological investigations—including the preparation of vaccines—which the modern practice of medicine renders so essential for the efficient treatment of their patients.

The West Riding Panel Committee are, however, still pushing forward their views. They have brought their proposed scheme to the notice of the Ministry of Health and one of the largest approved societies, and it is their intention to see that the need for full laboratory facilities for every insured person throughout the country is brought to the notice of the coming Royal Commission.

In the meantime, the annual conference of Panel Committees, held in October, 1923, have approved the following resolution brought forward by the West Riding Panel Committee :—

"That it is essential for the satisfactory treatment of diseases occurring amongst insured persons that a full and complete laboratory service should be established in every area, and that the Insurance Acts Committee should be requested to take all necessary steps to ensure that such a service should be established at the earliest possible moment."

The annual conference of 1922 had already given support to some such scheme on the motion of a leading representative of a Yorkshire insurance committee.

SOME FURTHER SINS OF CIVILISATION.

To show that the vis medicatrix naturæ is coming to the front in practice and treatment of disease, we have only to instance the vogue of heliotherapy and of the return to more natural conditions as regards diet. There are, however, many other practices of daily life in which we have strayed from the early and presumably saner customs of the race, and Dr. C. W. Laver, of Western Australia, writes to us on the disadvantages to health entailed in our present mode of performing the act of defæcation. He states his conviction that the cardinal and sole factor in the causation of appendicitis is our artificial and unnatural posture in defæcation and in contradistinction to the squatting position for the following reasons. First, the box seat posture defeats correct direction of expulsion of excrement; secondly, it defeats gravitation; thirdly, it defeats the free power of the expelling muscles; and, fourthly, it defeats the support of the thighs to the abdominal walls and protection of the appendix. He also holds that constipation, the most common perhaps of our modern ills, is due to using the unnatural artificial method which causes abdominal strain. These reasons find their application in the causation of appendicitis through the forcing of fæcal matter from the intestinal canal into the appendix, and, further, the absence of protection of the thighs on the inguinal canal he considers an important causal factor in inguinal hernia.

CANAL CHILDREN.

CANAL boat children have for some time past been objects of solicitude in regard to their health and education. During the year April 1st, 1923, to March 31st, 1924, the chief inspector of the National Society for the Prevention of Cruelty to Children found[1] 225 children on canal boats, of whom 76 had been born there. Out of this number 158 were still under school age, and only 23 children—eight of them under 12 years of age—were seen at work on the boats. This great improvement on previous years is ascribed by the chief inspector to the work of the Society. It should, of course, be remembered that a departmental committee appointed by Dr. Addison in 1920 decided to prohibit children of school age from living on the boats during term time; this committee thought that in the long run the women, too, would leave the boats. The recent strike afforded the chief inspector opportunity of conversation with boatmen, when he found that the majority were in favour of leaving both women and children off the boats and working them by men only. While the average figures show no overcrowding on the standard of the Canal Boat Act, the chief inspector says that overcrowding does exist on a number of boats. Most of the one-cabin boats are registered for three adults, or two adults and two children under 12 years; in two-cabin boats registered for two adults and five children, the tendency is for the whole family to occupy one cabin only. Six fatal accidents to children occurred during the year, five by drowning and one by scalding; one girl of 7 years has fallen into the canal three times, and a boy of 11, already rescued 16 times, was nearly drowned last year. From the point of view of education, the exclusion of children from the canal boats, which is fast becoming an accomplished fact, is to be welcomed. As far as health is concerned they compare favourably with town children, the freedom of the daytime compensating for the narrow, unventilated cabins at night; the incidence of infectious disease has been slight. But it is evident that as time goes on there will remain little canal boat inspection for the Society to do.

[1] Annual Report, 1923-24. Victory House, Leicester-sq., W.C.

UNSIGHTLY WARTS.

To the Editor of THE LANCET.

SIR,—Referring to Dr. G. S. Sander's request for advice as to the treatment of small, multiple soft warts on the back of the hand (THE LANCET, August 2nd, p. 256), I beg to say that I have successfully treated many such cases with liquor ferri perchloridi fort, B.P., as an escharotic, by carefully applying it with a small, blunt-pointed glass rod, avoiding the skin around the bases of the warts.—I am, Sir, yours faithfully,

Jamaica, August 22nd. A. J. SALMON, M.D., C.M. Camb.

A DAY-BOOK AND LEDGER COMBINED.

THE "One Entry Medical Account Book" (London: H. K. Lewis and Co., Ltd.) consists of cover and four quarterly insets (complete 20*s.*, insets 3*s.* 6*d.* each, cover 6*s.*), and provides a simple method for the practitioner who has little time to devote to this side of his work. It will serve him to some extent to ascertain his financial position by means of a total easily available at the end of his financial year. The cost, however, seems a little high for the restricted scope of the book.

Stethoscope would like to know of some place along the French or Italian Riviera which would be suitable for a case of rheumatic arthritis (lady) and where the charges would be moderate. A place neither too gay nor too dull preferred.

Medical Diary.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, London, W.

MONDAY, Sept. 15th, to SATURDAY, Sept. 20th.—ROYAL WESTMINSTER OPHTHALMIC HOSPITAL, Charing Cross. Clinical Instruction every afternoon from 2 P.M. Wed., 5 P.M., Mr. Gimblett: Clinical Demonstration on Common Affections of the Eye. Thurs., 5 P.M., Mr. Morgan: Fundus Class. Fri., 10 A.M., Mr. Hine: Methods of Examination.—INFANTS HOSPITAL, Vincent-square, Westminster. Mon., 2 P.M., Dr. W. E. Robinson: O.P., Cases of Malnutrition. 3 P.M., Dr. Nora Schuster: Demonstration, Chemical Examination of the Blood. 4 P.M., Mr. Tyrrell Gray: Lecture, Pyloric Stenosis. Tues., 2 P.M., Dr. Eric Pritchard: O.P., Feeding Cases. 3 P.M., Dr. Caroline Maule: Demonstration, the Schick Test, &c. 4 P.M., Mr. Philip Franklin: Chronic Nasal Discharge and Sinusitis in Children. Wed., 2 P.M., Dr. Helen Mackay: O.P., Cases of Birth Injury. 3 P.M., Dr. Eric Pritchard: Demonstration, the Modification of Cow's Milk. 4 P.M., Dr. Donald Paterson: Lecture, Infections of the Urinary Tract. Thurs., 2 P.M., Dr. Donald Paterson: O.P., Types of Diarrhœa. 3 P.M., Dr. Eric Pritchard: Demonstration, Stools. 4 P.M., Dr. Helen Mackay: Lecture, Anæmia in Infancy and Childhood. Fri., 2 P.M., Dr. Eric Pritchard and Members of the Medical Staff: Round Table Consultation. 4 P.M., Dr. Donald Paterson: Cyclic Vomiting. Sat., 3 P.M., Visit to St. Margaret's Hospital for Ophthalmia Neonatorum.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith, W.

MONDAY, Sept. 15th.—11 A.M., Surgical Registrar: Surgical Wards. 12 noon, Mr. Simmonds: Applied Anatomy. 2 P.M., Mr. Addison: Surgical Wards.

TUESDAY.—11 A.M., Dr. McDougal: Electrical Dept. 12 noon, Dr. Burrell: Chest Cases. 2 P.M., Mr. Sinclair: Surgical Out-patients.

WEDNESDAY.—10 A.M., Dr. Saunders: Medical Diseases of Children. 2 P.M., Dr. Owen: Medical Out-patients. 2.30 P.M., Mr. Donald Armour: Surgical Wards.

THURSDAY.—10 A.M., Dr. Grainger Stewart: Neurological Dept. 2 P.M., Mr. MacDonald: Genito-Urinary Dept. 2 P.M., Mr. Simmonds: Surgical Out-patients.

FRIDAY.—10 A.M., Mr. Dudley Buxton: Dental Dept. 2 P.M., Dr. Burrell: Medical Out-patients. 2 P.M., Mr. Vlasto: Throat, Nose, and Ear Dept.

SATURDAY.—9.30 A.M., Dr. Burnford: Bacterial Therapy. 10 A.M., Dr. Saunders: Medical Diseases of Children. 10 A.M., Mr. Banks-Davis: Operations on Throat, Nose, and Ear.

Daily 10 A.M. to 6 P.M., Saturdays, 10 A.M. to 1 P.M., In-patients, Out-patients, Operations, Special Departments.